

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Boston, Mass.

Vol. III No. 25

June 25, 1969

Price: \$9/year

Software Testing Not Yet Possible, Licklider States

WASHINGTON, D.C. — The quality of present day software is not yet reliable, supporting large, complex systems such as an antiballistic missile (ABM). Furthermore, such systems will be beyond the state-of-the-art for at least a decade, according to Dr. Professor J.C.R. Licklider, an established computer expert.

Licklider's views appear in a

recent report on the ABM prepared at the request of the ABM Board M. Kennedy (D. Mass.).

This does not yet exist, even theoretically, a way to determine if a software system does the job required, the report says. Large systems invariably have bugs, and the only way to find long periods of trial and error testing are required. But an ABM system, by its very nature, can

never be tested adequately; yet it requires unusually high reliability.

Software is one of the major reasons that the report concludes that the proposed Safeguard missile system would not perform as required and could not be deployed at this time.

Licklider, one of the developers of time-sharing and author

of the computer section of the report, told CW: "If such a system [as the ABM] is tried in the next decade, it will not be effective."

The report was prepared by Dr. Jerome Wiesner, president and presidential science adviser (1961-64), and Harvard Law School Professor Abram Chayes. It has been published under the title *ABM: An Evaluation of*

The Decision to Deploy an Antiballistic Missile System and includes articles on the political effect of such a system, as well as on the practicality.

Computers Most Complex Ever

An ABM system is made up of three parts — radar, computers, and missiles. According to the

(Continued on Page 27)

DPMA Show Draws Record Crowd

CalComp Announces 2311-Compatible Disk Drive

MONTREAL — The DPMA show opened with records being broken in all directions. Before the ribbon was cut to open the exhibit area, and while most of the crowds were still on their way to the show, the DPMA record had broken previous records. So had the number of wives and the number of exhibitors present.

CalComp pulled a major surprise by announcing a number of new products not yet planned to be introduced. It has specialized for many years. Instead, the products are clearly aimed at the mass market.

30-Megs: Disk Drive

The first items included an IBM-compatible, 30-megabyte-access-time disk drive for \$18,500 ("cheaper and twice as fast as the IBM 2311") and a buffered keypad ("can increase productivity by 50%").

Perhaps the most significant event in the disk area, CalComp came out with a new marketing technique for its disk packs — grading them by the number of their identifiable weak spots.

These weak spots, CalComp said, are not detected on normal disk

drives, but can be found by more careful examination with special equipment. On a user's disk drive, they would still pass as being "error free," at least when first used, but later dropouts could be expected at the point where the latent problems exist.

3 Grades of Packs

The new grading structure puts a premium on packs having neither latent errors nor other errors. CalComp will sell these premium packs at \$490, as opposed to \$435 for packs with up to five weak spots, or \$350 with up to 10 weakspots.

The idea of improving the quality of disk packs apparently will be a popular one in the future. Considerable attention was being paid to a disk drive by Peripherals, Inc. and came in two models. One of them tested the 6-disk packs, and one tested the large 2314 pack.

The tester, which costs \$52,000 for the smaller version, uses a 7-minute, wired-in program which prints out the locations of each dropout.

Getting to Market was quite

(Continued on Page 3).



Eric Ustad, DPMA general conference chairman, and Charles L. Davis, DPMA international president, watch their wives cut the ribbon opening the DPMA show. (CW Wirephoto by Farmer)

Capitalizing on Some EDP Salaries Can Be Postponed Until IRS Ruling

WASHINGTON, D.C. — Software tax problems, created when the New York region of the IRS developed a new method of calculating what programmer and system analyst salaries must be partly capitalized, have ended at least temporarily.

Deference to the regional ruling is "that nightmare, software" must be capitalized until a national ruling was given [CW, May 21]. The IRS said firms may either capitalize the software and a decision is made

or if a variance came after *Computerworld* reported on the pos-

sition taken by the New York Region, and on the apparent difference between various IRS offices, it is to be another study of the matter was in progress.

Under the New York ruling, demanding compulsory capitalization, profitable companies would have found themselves paying additional taxes (and showing higher profits).

The amount involved, according to the IRS, is not large, roughly equivalent to an additional tax burden of 25% of the hardware rental cost of the installation.

On the Inside

Are General Purpose Computers Being Surpassed?

—Page 17

An In-Depth Look At EDP Education

—Page 15

Input Your Bits,

Page 40

New Gambling Term

Applications 30

Editorials 10

Education 15

Finance 42

New Products 6

Societies 22

Software 40

GE Testing a Network to Provide Nationwide Access to Central Files

BETHESDA, Md. — The final test of a computer network that provides for centralized access to data from local telephones throughout the U.S. and probably from Europe, is in progress. This news highlighted a description of General Electric's plan to expand one of its activities in the service field during the next few years.

Paul W. Sage of GE said that the network, to be started out of Cleveland, will be used to develop their own private information systems and to access the files simultaneously from around the country. Communication

satellites would be used if the system were spread to Europe, he said.

GE service, which will incorporate present GE time-sharing services, will be in operation late this fall in nearly 40 metropolitan centers, probably making it the largest service in the growing industry.

Alcatel, a \$34 million investment is currently committed for the network.

Details of other plans announced by GE for its various computer-service activities are given on page 27.

An End to Inflexible Leases?

Lease Signed Allowing Return of Unwanted Equipment

REDONDO BEACH, Calif. — A new type of third-party lease for computers, one which offers the user's option of inflexibility, came to light here last week. Involved is a \$10 million dollar leasing arrangement for IBM 360/30s, 40s, and up between TRW and Randolph Computer Co.

Under this arrangement TRW can return up to 40% of the equipment to Randolph during the lease period, just as it might return equipment which it was renting directly from IBM.

Any part of the equipment can be returned if it turns out that some part of the equipment is overloaded, or, alternatively, is

a "lemon" in actual operation. TRW will be able to reconfigure the equipment.

No similar type of "reconfigurable" lease has previously been publicly known, although possibly other large contracts have included this as a special clause.

The 42-month contract's main point allows Randolph the right to return to Randolph any CPU or peripheral units up to 10% (\$1 million) of the total \$10 million during the first year.

Over the remaining 30 months of the 42-month period, TRW has the right to return an additional 30% or \$3 million in equipment for credit.

TRW's minimum total obligation, however, remain at \$10 million.

Lowell C. Carpenter, division material manager of TRW's Software and Information Systems division, paraphrased that old cliché when he told CW, "They laughed at me when I said I wanted to return equipment that no longer was useful to us for full credit against the total contract price."

Carpenter's ideas were based on "the need for flexibility to change, to reconfigure, or terminate EDP equipment that is used in a scientific and research oriented operation."

Carpenter recalled that his pro-

posals to leasing companies often included a blunt refusal that Randolph st. first.

"DPEAG, for example, was in the running but felt it necessary to back down at the contract signing stage," said Carpenter.

Randolph did, however, modify TRW's original list of equipment by prohibiting any IBM Series 1800 and Model 20 equipment. The contract is composed mainly of 360/40s, 50s, and 65s.

Jack A. Arnett, executive vice president at Randolph Computer, said that Randolph did charge a premium for the return option. TRW was charged the

36-month rate for the 42-month period.

The contract was negotiated in August 1968 and was effective Oct. 1, 1968.

Arnett mentioned that Randolph's major consideration in writing the contract was that it called for a money system and that so far TRW has not used the option.

Pentagon Orders 2 Dual GE-635s, 5 Satellite 115s

SCHENECTADY, N.Y. — Two dual GE-635s, with five satellite GE-115s, have been ordered by the Pentagon as a computational hub for the Air Force management data system.

The data service center also provides data automation support to the secretary of defense.

The two large-scale GE-635s will replace eight existing IBM systems at the center. The five small-scale GE-115s will provide the initial connection to remote terminals within the Pentagon and the Washington area, accessing the large GE-635s. The system cost is \$12.2 million.

Installation of the equipment is scheduled in two increments starting in the late fall.

Wescon Includes 5 Tech Sessions On Computers

SAN FRANCISCO — Five technical sessions, out of 23, at Wescon's four-day meeting at the Cow Palace here August 19 to 22, will concentrate on the computer field.

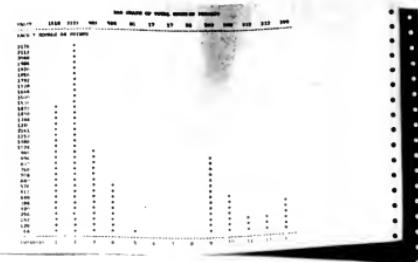
All the sessions will be held in association with meeting rooms which will be constructed especially for the meetings.

Format is for three sessions to run concurrently each morning and afternoon.

At the same time, 1,180 displays by more than 600 manufacturers will be on display.

Each of the technical papers represent a single subject of technology or management.

Now there's a retrieval system that not only analyzes and presents data, but can even draw you a picture.





The keyboard recorder/verifier, foreground, puts the data on a tape cassette, which is later translated onto computer tape by the converter, background.

3-Track Tape Produced by Input System Can Be Read by 7- and 9-Track Drives

PHOENIX — Keyboard input that can be read by nearly any computer is the claim for a new series of keypunch-replacement units.

Variable length records (in fixed length blocks) are keyed onto a tape cassette. An ASCII code is mapped to the manufacturer, Computer Access Systems. This recording is serial, low order first, to allow communications use with hardware currently under research.

The cassette is then read into a converter, which writes onto standard 1/2-in. magnetic tape, using only the three middle tracks. This, the company says, provides more than enough sig-

nal to allow reading by existing 7- or 9-track tape units.

The information is reformatted and unblocked by special software, and processed through a translation table into computer-usable information. The table is written in the simple Cobol according to the company, to allow compilation by virtually any Cobol compiler.

Two input units are offered. The Model 4000, a keyboard/verifier, sells for \$3,425 and leases for \$175 per month. The Model 2000, with no verification capability, sells for \$1,925 and leases for \$43.50 per month.

The Model 6000 converter sells

for \$9,850 and leases for \$275 per month.

Deliveries are scheduled to start "very soon" a company spokesman said.

Computer Access Systems has offices at 3050 W. Clarendon here.

First 'Bug' Was Really a Moth

BOSTON — Do you know the origin of the term "debugging"?

Back in 1948 at Harvard University, the programmers and engineers were having trouble getting a program to run. The computer, it seems, was a bit "buggy" with relays, rather than our current core memories. After a lot of hunting around and a lot of head-scratching, the engineers found a moth trapped inside one of the relay cases. It had been triggered as a result of the triggering of the relay.

According to Cmdr. Grace Hopper, one of the programmers present at the Univac



Mark II installation then, the moth was enshrouded in the machine's log with Scotch tape, and it is still there to this day.

The bug may have been removed from Mark II, but the word still gets a lot of exercise.

DPMA Conference Opens With Record Attendance

(Continued from Page 1) a struggle for many people, with planes and airline buses all experiencing problems.

Some 3,000 attendees coming from Minnesota delayed coming when a tractor crashed into the only BOAC airliner in the area. As a result, they arrived here at about 5 a.m.

Others from Rochester reserved their "confirmed" reservations on nonexistent flights, and many from New York, Philadel-

phia, and Boston found that even "confirmed" reservations did not provide them with seats on the scheduled planes.

But the hotel situation — Spring Joint Computer Conference in Boston — seemed under control. Most people were spending their time working out how they could best take advantage of activities at the conference rather than sleeping about where they could sleep.

Data Set 'Can Triple' C2 Transmission Rate

SILVER SPRING, Md. — A \$10,000 data set, which allows private 1,400 bit/sec. lines to handle signals at three times that speed with only normal (C2) conditioning, has been introduced by Rixon Electronics, Inc. for delivery late this year.

The data set, called Sebit-72, is especially designed for high throughput in remote batch applications or for increasing core-to-core transmission rates between central and remote computers. The company says it is not being considered for dial-up operations because only about 10% of the common carrier dial-up network would be able to use the equipment.

Computer Not Listed

Rixon expects the equipment to be able to work with most computers, but is not listing those they consider suitable until tests have been completed and the manufacturers have

agreed that the unit is competitive. Other Rixon units are currently working with IBM and Univac computers with the manufacturers' approval.

Successful tests with military computers have been completed on the unit and production has started on the civilian model. Tests on particular computers are currently scheduled and are being set up.

Techniques Involved

Immunity from ambiguity of the phase of the recovered carrier is achieved by using two two-level data coding. An error-detection indicator flashes a "data transmission" light when errors are detected.

The Sebit-72 is not pattern sensitive to input data because of the use of a special, internal code converter. Continuous automatic adaptive equalization is supplied by the receiver and receiver-decoder portion of the unit. The Sebit-72 continuously measures the quality of the circuit, and equalization is continuously updated without operator intervention. This compensates for the distortion inherent in telephone transmission and for amplitude deviations sometimes encountered in telephone systems.

Picturephones Used as Data Terminals To Retrieve Information From Computer

PITTSBURGH, Pa. — The Bell system's Picturephone is being used to use at the Westinghouse Electric Corp. as a desk-top information center.

Under the experimental system, a Westinghouse "executive can dial a telephone number and obtain the desired information in graphic form on the Picturephone screen."

The information is retrieved from a computer at the Westinghouse Tele-Computer Center in Braddock Hill in suburban Pittsburgh.

The program is part of a six-month Westinghouse trial of Picturephone service in cooperation with Bell. Forty Picturephone sets are installed for the trial period in Westinghouse offices and computer centers in Pittsburgh and New York.

"We thought this would be a good way of demonstrating what Picturephone can do besides providing video phone conversations," said R.C. Cheek, director of management systems for Westinghouse.

"We decided to select a variety of data-retrieval applications that would demonstrate the instrument's versatility."

Using the Picturephone, a user can dial a number to obtain domestic, Washington, and international news items or information of foreign currency exchange rates.

Or he can get late stock-market reports, or daily reports on the economy, or information on a program being carried on near Baltimore. The computer also stores Westinghouse Broadcasting audience rating information and reports on the company's internal operations.

Obtaining the information is as simple as making a phone call.



R.C. Cheek, Westinghouse director of management systems, uses his Picturephone to call up information from the company's computer.

The user dials the computer's phone number and then dials his own extension number to identify himself as caller. The computer then displays on the 5-1/2-by-5-in. Picturephone screen the kinds of information available.

The user then dials the number indicated for the data he wants.

Westinghouse management systems personnel adapted the Picturephone to the computer display applications using additional equipment furnished by Bell. The programming was done by the Westinghouse Information Systems Laboratory and the Tele-Computer Center.

The information is fed to the computer from several sources. The company's public relations department and a wire service provide news items. Foreign cur-

rency data is supplied by a bank and stock information, updated hourly during trading on the New York Stock Exchange, by a brokerage.

The computer can even be programmed to dial a number it gives to which caller. When a line executive calls, for instance, the index lists a number he may dial to obtain particular operating data concerning his own organization.

Other callers, however, are not shown on the index number. Should they dial the number, the computer politely informs them they have made an "input error."

"This just demonstrates one of the capabilities of the system, that of providing selective information to selected users," Cheek said.

Small Time-Sharing System Provides Big System Features

MAYNARD, Mass. — A new, special-purpose or single-language, small computer time-sharing system using the conversational language, Focal, has been introduced by Digital Equipment Corp.

The system is designed specifically for educational and engineering applications, Digital said. But because it lowers the time-sharing terminal cost to \$5,400 with a two-user version, a price yet to be offered, and a price lower than the yearly rental rate of large, time-sharing computer terminals, it is expected to have a variety of other applications.

The maximum number of terminals in the system is seven. With the addition of more core memory and other hardware options, the number of terminals can be increased to 16 or more.

The system may be general-purpose, giving it the capability of using a variety of computer languages, Digital said.

The key to the system, which can be installed on any DEC PDP-8 or PDP-8/A computer, is Focal. Disk capacity can vary from 32,768 words to more than a million words, depending on user requirements. In all cases, Focal permits the storage of programs in a common library

on the disk, Digital said.

The system is designed so that if a user designs a program requiring more than his allotted space in core memory, the program can be broken into segments, and the needed segments stored in the disk storage unit. When it is time to call up this program, Focal first removes the segment in the common memory and then reads the segments from the disk storage unit, automatically chaining the program together in its proper sequence. There is common storage of up to five variables between segments, Digital said.

Focal was designed for use by one operator at any of DEC's PDP-8 family of small computers. Since then, two- and four-user versions have been made available for use with the PDP-8/E. Now, however, two- and four-user versions for use on DEC's medium-scale, 18-bit computers. Focal (Formula Calculator) is similar to Joss.

Focal's 12 functions include trigonometric, logarithmic, device controls and sign part, integer part, absolute value, square root, and random number. Individual programs can eliminate the need to correct an entire line due to one typographical error. A trace feature allows an operator to determine not only what the error is, but also its location in the program. Digital said.

Other program specifications include five arithmetic operations — exponentiation, multiply, divide, add, and subtract — and an exponential range of 10 to 10¹², plus or minus 5000 power. All variables must be scripted. Two arithmetic subroutines are available so users can choose the correct size or ten-digit precision.

Multisuser versions of the language have proved appealing, according to Norman Doering, marketing manager for the product, allowing two, three, and four users to work on different problems, as if each had his own computer. Now, a similar advantage is available for up to seven users, each of whom has access to disk storage for his programs, he said.



AT&T's Joseph Rott makes a modification to a circuit-order sketch based on information retrieved via the terminal.

AT&T Computer Speeds Installation of Circuits

CINCINNATI, Ohio — New, long-distance telephone circuits will be operating month — even years — sooner because of a major computer installed here.

AT&T Telephone and Telegraph Co.

Engineers in the corporation's circuit-layout engineering office say the computer will eliminate more than one million follow-up telephone calls previously required to design and produce new, long-distance telephone lines.

Robert Cooley, AT&T's data processing manager here, said:

"The computer is the brain of a Network Information System (NIS) that will eventually handle hundreds of engineers and technicians all over the country to find out, within seconds, the status of any new circuits. Initially, several groups of engineers and technicians will be assigned with the computer here."

A typical inquiry might be from a circuit-design engineer

determining whether equipment for a particular circuit has been built.

The engineer sits down at a CRT terminal and enters his request. The computer retrieves the information and flashes it on the screen. Upon request, the computer also will print a hard copy of the information.

If the engineer wants to change the inquiry, he types corrections, which subsequently appear on the screen in proper position.

"Having immediate access to such information will eliminate communication slippages and paperwork inefficiencies," Cooley said. "It will also allow us to plan more efficiently for additional circuits to meet growing telephone needs."

Since Cincinnati is AT&T's national center for interstate circuit design, use of NIS will largely be centered here. Seventeen of the IBM 2260 terminals in the installation, however, will be used to plan more efficiently for additional circuits to meet growing telephone needs.

"The information stored in the 360/50 here," Cooley explained, "is updated constantly from records being processed at AT&T's office in White Plains, N.Y. A large computer there is fed up-to-the-minute information on every working transmission circuit in the U.S., as well as those under construction or consideration."

As updated information is received at White Plains, it is recorded in the computer and transmitted via telephone lines to the computer here for access through NIS.

Circuit-design engineers are constantly looking at circuit-use patterns across the country, in an effort to stay abreast of the growing need for telephone service.



Order Entry System

Blue Chip Stamps, a Los Angeles-based trading stamp company, is using Marketing Systems, Inc. data recorder/transmitter to handle orders in its 84 redemption centers. Orders to the warehouse are recorded on a magnetic tape cartridge via a 10-key adding machine that also produces hard copy. The tape is then rewound and the data transmitted when an operator at the computer center calls the store with a card-dialer telephone. An MSI-214 nine-track, 800 bpi/in. receiver at the center records the data on magnetic tape for processing by the center's IBM 360 computer.

COMPUTERWORLD
A COMPUTER INFORMATION COMPANY

TM Reg. U.S. Pat. Off.

Weekly Newspaper — Second Class Postage Paid at Boston, Mass. Published every Wednesday by COMPUTERWORLD, Inc., 60 Austin St., Newton, Mass. 02160. Telephone: (617) 332-5006 & TWX: 710-544-6500. Subscriptions: \$10.00 per year by COMPUTERWORLD, Inc. Alan Taylor, Editor; Robert M. Peterson, News Editor; Neal Winter, National Sales Manager; Margaret Phelan, Circulation Manager; Henry Flings, Art Services Supervisor; Kate Rachman, Typesetting Supervisor.

Patrick J. McGuovern, Publisher; W. Walter Bond, Associate Publisher.

Subscription rates are: \$9 for one year, \$16 for two years. Add \$1 per year for Canada; \$4.50 per year for Foreign. Please send all correspondence to COMPUTERWORLD, Inc., 60 Austin St., Newton, Mass. 02160. COMPUTERWORLD, © 1969, COMPUTERWORLD, Inc.

Reproduction of material appearing in COMPUTERWORLD is strictly forbidden without written permission. Send all requests for permission to the publisher.

BPA Membership Applied For

Series on Computers and People Produced by Educational Station

By Peter L. Briggs

CW Staff Writer

BOSTON — A new radio series on the impact of computers on people's daily lives and their uses in business and industry began June 15 by the National Association of Educational Broadcasters under the auspices of National Educational Radio.

The old motto, found on most IBM-card type bills and payment documents (IBM, of course, or mistake) is the title and the theme of the 16-week series produced by "Jiffy" Johnson for the University of Illinois' educational station, WILL, in Urbana, Ill. She is a member of the station's programming staff.

Locally, the series is being run Sunday nights on WBUR, Boston University's radio station, but complete national schedules are available by contacting WILL.

The first program dealt with the terminology and concepts used in binary/digital and analog computers. The terminology was complex, but the explanations and anecdotes were very well done and easily understood, listeners told CW. Many well-known people in the industry are scheduled to take part in the series.

The next segment is on the use of analog computers in science and business.

Membership Votes Politics Out Of ACM's Official Operations

NEW YORK - Politics was ruled out of ACM official operations as a result of the membership vote on one of two questions of importance. The ballots were counted last week.

However, the subject seemed unlikely to rest quietly because a very substantial minority (20%) voted in favor of changing the constitution to allow political stands and an even larger minority (35%) voted to boycott CIO's cage in retaliation for the police activities during the Democratic convention.

On the question of changing the constitution, 2059 voted "yes" and 7938 voted "no." On the question of whether 167 voted "yes" and 6460 voted "no." About 40% of the society's membership cast ballots.

Stronger Than Straw Vote

The straw vote followed quite closely the raw vote of the council, which had seven voting "yes," 13 "no," and three not voting. But the strength of the members favoring political involvement was twice that which might have been expected from the council straw vote which showed two in favor of revising the constitution and 19 against.

A number of people have objected to the speed with which the votes were put to the membership without what they felt was sufficient time among the discussion. The speed was actually occasioned by a petition presented at the December council meeting which called for the ACM to take a position against the Vietnam War. The council bypassed the petition and instead instituted the question of importance.

The Democratic convention in Chicago and its connection with the ACM had a longer history. It had originally been decided to hold the annual ACM conference in Chicago at the time the Democratic convention was held. However, Anthony Oettinger, then ACM president, in a one and a half hour telephone call with the present year's council members had the conference moved to Las Vegas to prevent possible problems.

Bills on EDP Damages Die As Legislature Adjourns

ST. PAUL, Minn. - A bill that could have made it legal to use a data processing service organization for damages resulting from EDP processing of an individual's records has died in committee.

Senate File 433, introduced by State Sen. William B. Dostland, provided, in part, "Wherever is found that a service or property is as a result of an error made by a computer or as a result of the keeping of records by automatic

data processing has a right of action against any person maintaining or utilizing such computer or ADP equipment which proximately caused the injury for all damages sustained..."

The bill was stalled in committee with the legislature adjourning. It is anticipated that a similar bill will be introduced next session.

A nearly identical bill, House File 104, was introduced by State Rep. Douglas Sillers.

Banks Very Vulnerable

Banks have expressed the feeling that it could make it "economically prohibitive" for banks to employ EDP for correspondence, as well as for normal processing.

Precedents

Two court cases recently have been brought against companies for similar damages and have been won by the plaintiffs.

State Sen. Kelton Gage was a member of the judicial committee which heard the bill. His law firm won a \$480,811 award for a client, when IBM's Service Bureau Corp. was ordered to pay damages for allegedly misrepresenting the capabilities of an inventory control system. SBC has appealed.



Bob Ziegel ready to race CW's car at SCCA National Championship races in Thompson, Conn.

CW's New Race Car in Stiff Competition

NEWTON, Mass. - Computerworld's new race car, a Crossle 16 F, Formula Ford, built in Northern Ireland, is set to race next for the national championship at Lime Rock, Conn., July 5.

Formula Ford is a new class in the U.S. this year. It is intended to provide highly competitive, low-cost racing.

The engine is essentially a stock English Ford Cortina powerplant, and the cars are limited to production wheels, four-speed transmissions, and many proprietary suspension and body parts.

Its top speed is from 130 to 140 miles per hour, and its weight is about 880 lb.

Computerworld's New England regional sales manager, Robert Ziegel, is the driver. In his first race, he finished 13th. Computerworld finished fifth of 13 starters and was beaten by only one private entrant. The first three cars to finish were factory sponsored by various manufacturers.

In his second race at Lime Rock, Conn., Bob finished third out of 33 entrants. He led the race for a portion of it. According to Bob, he kept "drifting out on that marshmallow track." It had pouted rain all that

morning.

The remainder of the July schedule for the CW car is as follows:

The 12th, Connecticut state area championship and July 27 at Lime Rock, Conn., for the national championship.



computer planning and implementation

PLANNING, IMPLEMENTATION, AND EVALUATION OF COMPUTER CENTERS AND COMPUTER SERVICES

university science center
3113-3125 Forbes Avenue at Ellsworth Boulevard
Pittsburgh, Pennsylvania 15213
Telephone: (412) 693-4220

a div. of USC, Inc.



COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

600 AUSTIN STREET, NEWTON, MASSACHUSETTS 02169 • TELEPHONE: (617) 260-0800

GUIDE TO NEGOTIATING A COMPUTER CONTRACT

This handy guidebook was prepared by Robert P. Bigelow with the assistance of the Computerworld editorial staff and contains what you should know when entering a purchase or rental agreement for both hardware and software.

There are chapters on the elements of contract law; terms and conditions applicable to the purchase and/or rental of automatic data processing systems; management's responsibility for the total operation - not just the hardware; a computer contract checklist; and a comprehensive bibliography.

40 pages, soft cover, \$5.00. For your convenience, clip the coupon below.

Please send me copy(ies) of GUIDE TO NEGOTIATING A COMPUTER CONTRACT at \$5.00 each.

Name

Company

Address

City

State

Zip

Return to: RJ, Computerworld-
60 Austin Street, Newton, Mass. 02160

TLW Computerworld SALES Corner

IBM 10K-1401-Tape
1401-1402-1403-1405 - A complete system with all features. Four 7291's.

IBM-1041-B4-Disk
A complete system with disks and console inquiry. Printer 600LPM, Punch/Read, Model 1. Immediate delivery.

IBM-7070-10K or BK
Excellent second system. Available immediately.

IBM-1440-12K-Tape Optional
A large 12K system, many excellent features. 1442, 1443 (144 print positions), 1447 and three 1311 disks. Immediate delivery.



Credit Check System Said to Speed Sales, Reduce Risk

COLMAR, Pa. — A retail credit authorization system that features inexpensive units to display various types of answers to a clerk's inquiry is operating successfully in several stores. Advantages claimed by the



manufacturer, Credit Systems, Inc., include positive identification of risks to be referred to the credit department, greatly speeded clerical functions, and virtual removal of "bad debt" risk.

The system is called Credit-Chek. It consists of inexpensive devices at counter locations and a central processor unit that can take daily input of doubtful account numbers from the retail credit function.

The Credit-Chek uses a check digit technique to provide protection against forgeries. It can look at the number of daily transactions in every active account, and can flag purchases which bring a customer's balance over a preset limit.

It can also take into account the current or past due nature of accounts, as instructed by the credit department, the company says.

Recently developed hardware also allows the credit function to input either complete or specific

New Products

account updates on punched card paper tape, or magnetic tape, according to the company.

The counter units, which contain light displays, cost \$10 per month over a five-year lease period.

A processor said to be capable of handling 1,000 accounts has a lease price of \$1,000 per month.

Cost of other peripheral units, including multiplexors with the claimed capability of handling about 150 counter units, will vary according to configuration.

Credit Systems, Inc., can be reached at P.O. Box 105, Colmar, Pa. 18915.

CRT Terminal

A "Standalone" version of the NCR 795 data display terminal

has been announced by the National Cash Register Co.

The new terminal has its power supply, logic, keyboard, and serial in an all-in-one design. Designed in an NCR 795-620, it user who requires only a single CRT, the company said.

NCR also announced that it will market for the first time a standard computer terminal with 795 data display capability. Previously, NCR users who needed hand-copy capability had to acquire teletypers through other suppliers.

The NCR 795-620 "Standalone" version is priced at \$4,750. It has a monthly rental of \$100. The teleprinter, the NCR 795-640, sells for \$1,750 and rents for \$50 a month.

Higher Speed Modems

International Communications Corp., a subsidiary of Milgo Electronic Corp., has announced its Modem 5500 series of high-speed data sets.

Modem 5500/96, the first data set in the series, transmits complete messages at the rate of 9600 bits/sec. Based on ICC's unique narrow-band design, the new unit is said to be capable of operating at 9600 bits/sec over voice-grade, type C2 (4B) telephone lines. It includes a built-in computerized automatic equalizer.

Modem 5500/96, priced at \$1,150, is aimed at applications — including the time-sharing industry — which depend heavily on maximum exchange of information. ICC is accepting orders for December delivery.

\$186, with reels supplied at both prices. The will be available in July.

The company's address is P.O. Box 307, Los Gatos, Calif. 95030.

Magnetic Tape Cleaner

A magnetic tape cleaner that combines conventional light scraping techniques with vacuum cleaning has been announced by F.G. Felt, Inc. The MTC-100 magnetic tape cleaner is intended for the periodic removal of the dust and dirt which normally accumulate on tapes in use.

The supplier's address is 60 Union Ave., Sudbury, Mass. 01776.

Tape Winder

A series of motorized perforated-tape winders, with take-up speeds of up to 24,000 codes a minute has been an-



nounced by Robins Data Devices, Inc.

The new units feature slip clutches that automatically adjust speed, tension, starting and stopping, permitting intermittent operation without harming the tape or reader. Tapes may be up to 1/2 in. wide.

Model DWM-2B, at \$80, and Model DWM-3B, at \$85, have six- and eight-inch flanges, respectively. Both have a clip threading arrangement on single-flange reels that tilt back to secure the tape during winding.

Model DRM-5B, at \$85, has a shaft that accommodates any size reel with a half-inch inside diameter. For other reel sizes, hub adapters are available.

The company is located at 15-18 127th St., College Point, N.Y. 11356.

Punched Tape Splicing

Self-sticking preperforated Quik-Splices for fast jam-proof splicing of punched paper tapes is a new product of the W.H. Brady Co.

Of polyester film, opaque Quik-Splices are one-inch long, perforated in all fields for standard eight-channel punched paper tapes employed in systems with either photoelectric or mechanical readers.

The 0.0035-in. patches, with nonozing adhesive, are said to pass smoothly and cleanly through equipment without jamming. They are said to hold firmly to treated or untreated paper tapes as well as mylar, laminated, or aluminum tapes.

Literature and samples may be obtained by writing to W.H. Brady Co., 726 W. Glendale Ave., Milwaukee, Wis. 53201.

Last Month PICS COMPUTERS MATCHED 2,217 PEOPLE TO BETTER JOBS

Join PIICS' 30,000 Executive, Technical and Professional members who share computer time in their search for openings in today's booming job market. Employers like Honeywell, Chase Manhattan, IBM, AT&T, Bell Telephone, Krocenec, Park Davis, Raytheon and 333 others are in openings now. You can receive detailed print-outs describing each opening that matches your career requirements, etc.

For membership information call (609) 442-3141. Collect—or mail coupon.

NOT AN EMPLOYMENT AGENCY—NO EMPLOYMENT FEES!
PICSystem, Inc., DEPT. B, BENNINGTON, VT. 05201

Please send details without obligation.

Name _____ (please print)
Address _____
City _____ State _____ Zip _____

The company's address is 7620 N.W. 36th Ave., Miami, Fla. 33147.

Tape Monitor

A device that monitors the passage of paper tape, both off and back on the reel has been announced by Cycle Equipment Co.

Called Tape Minder, it releases tape only when demand (tension) and spools it back when that part of the device senses slack. Both parts of the unit are said to shut off automatically upon lack of demand.

Speeds range from 23 char/sec to 700 char/sec, the latter requiring a NAB hub. They are fully field tested, the company says.

Prices range from \$146 to



DO YOU SUFFER FROM THE MIS-PILOT SYNDROME?



Unfortunately most computer centers do incremental plotters are accurate, easy to use and very reliable. They have extensive software and produce beautiful, final plots. However, the lost time in producing interim plots is expensive, both in computer time and programmer time. To say nothing of the irritation in finding that a plot that takes one hour to produce has a slight catch caused by a program error.

Say your time, money and irritation with Fast-Pilot.

Fast-Pilot goes right on your present incremental plotter interface and uses all the plotter software. It displays your plot and a large storage tube in seconds. Find your errors, make your corrections and almost before you have done so your new plot is on the screen.

With Fast-Pilot you can magnify segments of your plot at the turn of a knob, to retain all the accuracy of the incremental plotter.

When you are completely happy with your display throw a switch and produce your final plot on the incremental plotter. Help stamp out the Mis-Pilot syndrome. Get Fast-Pilot.

For more information call or write.

Datatrol Inc.

KANE INDUSTRIAL DRIVE, HUDSON, MASSACHUSETTS 01745 617 562 3422

INTERCOMP ANNOUNCES

A NEW IBM

COMPUTER

SYSTEM

360/30 SPEED AT HALF THE PRICE

Data Processing Salaries at a New High, Survey Finds

ELMHURST, Ill. — A survey has revealed that salaries for persons employed in the electronic data processing field are at a new high.

The annual study, just released by *Business Automation*, reports weekly salary data for 22 different EDP jobs and covers 2,367 installations, totaling some \$2,500 employees.

The Manager of All Data Processing, which normally means the top man in the computer operation, earns a nationwide average of \$394 per week. This is up to 8% increase from the 1968 figure. Top average salary for the same job, on a city-by-city basis, was \$349 per week, as reported by New York City. Second highest weekly average of \$338 comes from Washington, D.C.

The lower ranges were reflected in the Jacksonville, Fla., average of \$263 and the Portland, Ore., figure of \$265. Regional areas also point up differences in salary structure. The EDP manager in the East South Central region, for example, averages \$272 per week, compared to a Middle Atlantic average of \$314.

In addition to the Manager of All Data Processing, figures for the Manager of Systems Analysis job indicate that this position pays an average of \$280 per week nationwide. The Manager of Systems Analysis normally holds full responsibility for the step-by-step study of procedures involved in the collection, processing, and evaluation of information about the company.

Another key position, that of

Manager of Programming, pays a nationwide average of \$251 per week. This position entails responsibility for all programmers in the department who are preparing instruction sequences for the computer.

The Manager of Computer Operations is in charge of all computer operators and earns a weekly average of \$211. Among the other positions reported on are Manager of Unit Record Equipment, \$175 weekly average; Manager of Teletype, \$115 average; Manager of Keypunch Supervisor, \$131 per week, average. Lesser positions within these and other departments are also detailed in the survey.

"Our survey turns up some interesting projections," states Arnold E. Kelen, editor/publisher of *Business Automation*.

Manager of Business Automation. "If we use the average number of employees per installation at 35.4, as indicated by the study, and today's generally accepted estimate of some 53,000 computers installed, that means there are 2 million people directly employed in the nation's EDP operations."

Unions are becoming increasingly aware of the breadth of the computer community, as reflected by the fact that more firms are joining union membership among the EDP group. Union activity seems to be concentrated in the lower-end positions, as reflected by figures indicating that 91.3% of Key Punch Operators are affected by union membership; these firms, 73.8% of Computer Oper-

ators, and 63.1% of the Unit Record Equipment Operators.

Educational requirements in EDP are also highlighted by the study. Among EDP Managers, 45.5% have a college degree, 39.4% of the Systems Analysts have a college degree, and of the Programming Managers, 26.3% are college graduates.

Weekly salaries for the EDP manager's job also fluctuate according to the size of the firm. In firms where monthly dollar computer rental costs are under \$3,000, the EDP manager averages \$228. In firms where the monthly dollar rental exceeds \$50,000, the manager averages a weekly salary of \$314.

Still another aspect of the survey reveals that 40% of all EDP installations report to presidential and vice-presidential levels — again, up slightly from last year's 39%. The fact that many firms are using and planning leasing operations, it is shown, continue to report to the EDP manager. Concerning the leasing aspect of the industry, computers and related equipment rented from the manufacturer total 74.8% as opposed to 22.1% purchased outright. Purchasing is affected by union membership; these firms, 73.8% of Computer Oper-

Instead of a faster computer, why doesn't somebody develop a faster programmer?



Announcing the next best thing:
Data Check Express, the first generalized
proprietary system designed
to save valuable programmer time
now consumed by data editing.

The Hidden Bottleneck.

One of the first things you learned about computers was "GI-GO." Garbage in equals garbage out. And that's data editing is so necessary.

The front end of every job is the great data-editing bottleneck; time is needed for coding, compiling, debugging and testing a custom editing program. If it's a hideous bottleneck, the time and cost for editing are hidden on your time sheets in all phases—problem definition, coding, testing, and (all too often) re-running an entire job fouled by bad data.

Our best estimate is that about 20% of every programmer's time is now used in data editing. Valuable programming time that could be used to get new jobs in the works... if there were an alternate to present data editing methods.

The Alternate.

DATA CHECK EXPRESS is the first generalized proprietary software program for data editing. It performs checking, validation, on-line error detection, error correction, file restructuring and file updating. **DATA CHECK EXPRESS** can free your programmers for more productive work by (1) eliminating the

need for original programming to edit new data, (2) getting new jobs started faster (an editing program normally written in 20 pages can be cut to 3 coding sheets which cuts debugging and testing time as well as coding time); (3) allowing junior programmers to perform the editing function; (4) providing a standardized, self-documenting procedure (instead of each programmer doing things his own way).

Why didn't somebody think of this before?

Probably because there hasn't been a company like Express Software Systems before. We're a three-year-old software company that believes high quality proprietary products point the way to answer your rising programming costs and the shortage of skilled programmers. And we live by our belief. We concentrate all our efforts in developing and marketing proprietary software in a single—Data Management. And Express Software Systems backs it up with a staff of highly skilled application specialists to provide technical support and systems maintenance.

DATA CHECK EXPRESS is our

second baby. Our first, EXPRESS III, a general purpose teletypewriter and summary reporting system, is doing very nicely, thank you, at several national companies.

Next Tuesday.

DATA CHECK EXPRESS (end EXPRESS III for that matter) is fully programmed and ready for tomorrow afternoon if you'd like. At the same time we'll teach your people how to use **DATA CHECK EXPRESS**. (There are only 18 commands to master so even low level programmers can become expert in about 2 hours.) By next Tuesday you'll be saving valuable time churning more information out of their computer of your users with faster turnaround.

DATA CHECK EXPRESS machine needs are IBM 360/30 end, OS or DOS, or any equivalent computer.

Fine, but how much?

If you go along with our estimate that data editing now uses up about 20% of every programmer's time, then **DATA CHECK EXPRESS** is one of the biggest bargains in town. The one-time cost equals about one-half of what you now pay one programmer for one year.

Interested? Get more details by attending one of our seminars or by having one of our people call on you. Write, wire or phone us:

Express Software Systems, Inc.

342 Madison Avenue,
 New York, N.Y. 10017. (212) 682-0011

2 DP Scientists Get Nato Award To Study Abroad

WASHINGTON, D.C. — American computer scientists have been awarded North Atlantic Treaty Organization (Nato) Senior Foreign Fellowships in Science, the National Science Foundation and the Department of State announced today.

The scientists will study new developments in computer developments abroad under a program designed to foster interchange of information among the member nations of Nato. With the cooperation of the Department of State, the National Science Foundation administers the fellowship program for U.S. citizens.

The fellowships enable universities and nonprofit scientific research institutions in the U.S. to send senior scientists, members to overseas and educational institutions in other Nato nations or in countries cooperating with Nato. This serves to strengthen the U.S. institutions' scientific work at the graduate or advanced level.

Engineering Institute To Offer DP Course

CLEVELAND — The Cleveland Engineering Institute, Ohio's largest engineering drafting school, will begin teaching computer sciences this fall.

Charles N. Zelenko, institute president, said the decision to enter the field was based on the demand for a quality school to train young people in the rapidly expanding data processing field.

Classes will be held at the institute.

INTERCOMP PRESENTS 1130/ACCESS*

THE DISK STORAGE SYSTEM for the IBM 1130 user



Without reprogramming, your IBM 1130 Computer will ...

- Compile...up to 35% Faster
- Assemble...up to 45% Faster
- Sort...up to 80% Faster
- Load...up to 120% Faster

Now, your 1130 Computer can access five to fifty million bytes of information on IBM 2311 compatible drives. With INTERCOMP ACCESS, your 1130 retrieves this information in under 50 milliseconds average... and without reprogramming.

* Patent Applied For

INTERCOMP ONE CENTRAL PLAZA CAMBRIDGE MASSACHUSETTS 02139
617-464-4700

Gentlemen:
Please rush all data on your 1130/ACCESS Disk Storage System.

NAME _____ TITLE _____
FIRM _____
BUSINESS ADDRESS _____
CITY _____ STATE _____ ZIP CODE _____
TELEPHONE _____ EXT _____

Please arrange for a demonstration.

- Up to Fifteen Times Your Present Access Speeds
- Five to Fifty Times Your Present Storage Capacity
- No Reprogramming or costly Conversions
- Nationwide Service
- Demonstrations Now

INTERCOMP • One Central Plaza
Cambridge, Massachusetts • 02139

Editorials

Unnoticed Revolution

In the pages of this week's CW we see details of yet another type of punch card replacement. This case is interesting because, like a number of other items now on the market, it makes use of computers to help the computer input problem. It serves a particular specialized era through the use of Cobol and through the use of tape cassettes. These allow for unusual flexibility in the placing of the key punch operations and in the flexibility of computer connections. This is good.

From a marketing point of view, the system has to find its own particular segment of the market because recently a number of other systems have been produced and successfully offered which handle other more or less specialized areas. Indeed the sheer number of these offerings has removed much of the news value from their announcements.

This is a pity because it may have obscured another message. It may have obscured the fact that you usually don't get a whole rash of announcements and deliveries unless there is a very good and worthwhile commercial benefit to the user from them. And so it may have obscured the fact that many people carry on with equipment that has been made obsolete by newer equipment in the market place and yet do not realize it. It obscures the fact that a revolution has occurred.

If your installation has not checked out its data input policies and procedures and the costs of them during the past two years, then with due respect we suggest that you may well be missing the chance to benefit from the revolution. This may be our fault because of the fact that we no longer put such an announcement in 43-point type on the front page. The headlines look much milder and now are found inside the paper. But whoever is at fault, it is not advisable to overlook revolutions. If you have not been looking, we suggest that you do so.

We are sure that you will find it worthwhile.

Let's Try Cooperation

The actions of standards committees are often of great importance to computer users — and this applies to more than the actual standards that are produced. There is only so much voluntary labor available, and its usefulness is of general interest. X3 has denied the general public, no matter how interested, access to its meetings and unfortunately has recently been completely misrepresented by the sponsor, Bema, about its actions on PL/I.

Despite this, the policy now proposed would permit Bema to continue its stranglehold on effective communications and to continue the undesirable situation in which standards are a plaything of a small clique.

We agree that a new public-relations policy for the standards operation is urgently needed, and we urge that it be one that genuinely expedites timely and accurate publicity and creates special awareness and increased participation in the voluntary standards program. In the past, we have offered to collaborate in an attempt to reach a reasonable understanding which can help achieve these goals. We offer it again now.

**Letters to the Editor****Poor Systems Design Work Seen as Blot on Profession**

I have just finished reading your article, "Errors Nearly Elect Candidate," in the June 11, 1969, issue. This is still another example of inexperience of untrained system designers not being able to see the forest for the trees.

There is no question in my mind whatsoever that the "zero insertion" feature of the 029 keypunch is completely misunderstood by users of data processing systems. The only justification for using the left zero insertion feature of this machine is when the data must be processed on older EAM equipment. When using general-purpose computers, there is really no justification whatsoever for not providing left justified numbers to be keypunched where remaining positions in the data fields are left blank. An extremely simple algorithm in a small subroutine can be used to right justify the data and then add zeros before printing. This technique can materially increase keypunch efficiency with a totally negligible expense in the computer operating time.

It's really a shame that this kind of gross mistake can be made by members of what we would like to call a profession.

On a similar note, on page 15, your short item entitled "Program Prints Letters Two-Up and Saves Time" — Hell, don't they all? Any general-purpose letter program which does not print letters two-up is obviously being written by "professionals" without regard to total utilization of available facilities.

I realize that this letter is somewhat irate, but I am beginning to wonder about the ability to mature as a profession if this kind of "improvement" is taken as a major step forward.

Jerry L. Ogglin
Washington, D.C.

MIT Defense Research Cut Seen as Face-Saving Move

Your article reporting MIT's plan to reduce defense related computer research at its Lincoln Laboratories [CW, June 18] comes just at the time a Washington Post survey on performance of modern weapons systems has been widely reprinted in newspaper ads throughout the country. The survey cites three systems as particular

"disappointments": the Dew line system, the Sage system, and Bemas (Ballistic Missile Early Warning System). All of these systems were designed at Lincoln Laboratories.

Perhaps MIT is withdrawing from defense research to save face. On the other hand, it may feel that the best way to serve the country is to not produce any more "disappointments."

Ian Martin

Cambridge, Mass.

Letter Crossed Paths With Story He Sought

I am delighted with your fine coverage of the SCCC held in Boston. However, I seemed to have missed completely any mention of the American Bankers Association Data Processing Convention held in Chicago, May 18-21. In view of the fact that the banking industry is one of the largest users of computer systems, I feel that Computerworld missed a "Golden Opportunity" to make many fine friends.

Kim Amann
Medium Systems Support

Burroughs
Detroit, Mich.
See "Raid Services Seen as Key to T/S Future," CW, June 18, Ed.



"Leave the Blinds Up - You Never Know When a Talent Pirate From a Computer Software Agency Might Be Spying on Us..."

Challenges to Computers — Part 1

Are General Purpose Computers Being Surpassed?

Computers have a history of success, and this is particularly true of the general purpose digital computer. Indeed, although there are other types — special purpose computers which handle specific jobs and analog computers which handle continuous variables rather than numbers — the success of the general purpose computer has been so great that it has taken over the meaning of the word "computer." The layman and the Wall Street special think of computers as *always* having been general purpose, always having been digital, unless specifically told otherwise.

Hanides Undefined Problems

The success of the general purpose computer comes in large part from the fact that it, and it alone, can handle problems that have not yet been thought about. You can make a general purpose computer and do all the engineering and ready its operating systems before really thinking about the problem it is to solve. As a result, it is economically practical to use general purpose computers, because they are not specialized to specific applications, and, even more important, it has been found to be practical to use them.

Risk Eliminated

The capability of using the computer, of knowing that the computer is going to be able to do what it is obviously a key item. Large firms do not put down thousands and millions of dollars on risks; they spend some form of security, and the general purpose character of a present day computer provides them with security in an unusual and often unique way. The computer, as a result of this, is now possible in suitable cases to give a firm the security of knowing that it really does understand its application and that it really can expect the system to perform properly.

Of course, at the moment these automated systems are themselves general purpose computers, but this is no reason to think that they can't be transformed to special purpose computers. Computers have got to be updated, and there are many other uses to which the general purpose equipment can be put. It is therefore quite practical to expect special purpose computers to be able to compete with the general purpose computers for these applications and not to be disqualified by the lack of knowledge of them as they have been for the past 10 years.

Reasonable Problem

This is, of course, very reasonable. The applications concerned are generally ones which are already in use with human supervision. Naturally exception cases are not precluded but are simply noted and referred to management for decision. This is not practical in any automated system, and so the provision of automated systems which could not be reprogrammed to take into account newly developed characteristics would tend to end in failure. And in fact a number of such attempts using the special purpose computers for this purpose did end in failure.

This was perhaps the key reason for the success of the general purpose computer in the market place. However, this reason is no longer valid. It is no longer a defense of the general purpose computer against the possible inroads of the special purpose computer.

IBM Under New Attack, This Time By Employees

WHITE PLAINS, N.Y. — After being sued by a number of employees by the Justice Department by the U.S. Government in recent antitrust suits, IBM is now apparently under internal attacks for allegedly maintaining double standards.

In an employee publication, the corporation, responding to an accusation that it had different standards for employees and for the corporation, described at length the company policies on moonlighting.

The double standard accusation was based on the argument that the company corporately purchased supplies from other computer manufacturers or re-labeled firms such as General Electric, RCA, and General Electric. It was also argued that an IBM employee while forbidding employees to moonlight for IBM customers. The argument was

that while the employees could be considered to be moonlighting by providing support of competitive activities, IBM could provide such support without being considered in conflict — and that this was a double standard.

In its response, IBM distinguished between its activation of moonlighting (from RCA's Hertz) or purchasing GE motors and an employee's position working for an IBM customer. IBM said that such moonlighting would "inevitably involve a potential conflict of interest, because his business loyalties would necessarily be divided between two employers who had a business relationship with each other. This, the company argued, made such moonlighting impossible." Because an IBM employee had the right to moonlight when no possible conflict of interest was involved.

Introduction

At a time during which it appears that computers are becoming almost all-powerful in the life of the nation, and when growth curves for the industry seem to be destined to break record after record, it is worthwhile to take the time to see what the potential challenges to the industry are.

In this article it is suggested that we may have overlooked the real meaning of the word "computer" and that the special purpose computer, which has been with us from the start but which has never played a major role in the computer industry, may be about to usurp the throne of the general purpose computer.

This article was extracted in part from a speech recently given by Alan Taylor, editor of CW, to the National Society of Controllers & Financial Officers of Savings Institutions.

Applications Now Defined

The reason it no longer holds valid is because many applications are now automated. They are defined thoroughly; they are running without the man supervising; they are running without the man understanding them. As a result of this, it is now possible in suitable cases to give a firm the security of knowing that it really does understand its application and that it really can expect the system to perform properly.

Of course, at the moment these automated systems are themselves general purpose computers, but this is no reason to think that they can't be transformed to special purpose computers. Computers have got to be updated, and there are many other uses to which the general purpose equipment can be put. It is therefore quite practical to expect special purpose computers to be able to compete with the general purpose computers for these applications and not to be disqualified by the lack of knowledge of them as they have been for the past 10 years.

May Be Economically Possible

However, the question is not only whether they are able to compete. Before this can be taken seriously, it must be considered whether they can be economically competitive, and here again it suddenly appears that the answer is yes, even though only marginally yes. This change has arisen because until recently we thought that a specially programmed computer must have an inflexible program — and we knew that an inflexible program would not sell.

Now it turns out that the basis of this assumption is invalid. It turns out that we were looking the wrong way at the special purpose computer and that in fact special

purpose computers can provide for the flexibility of operation which is the lifeblood of competition.

There are at least three different methods which allow us to provide computers that are programmable and yet are special purpose. The oldest is the general computer like the Burroughs TC500. This has a restricted area of interest and so is able to talk and accept simple instructions like "Take a letter, Miss Jones" easily and simply. And because in these systems you choose to use phrases like "Take a letter, Miss Jones" and other ones that mean something to you, you can use the instructions like "Add A to B, test it, jump to C" and 17th horrors of the old computers. The TC500 uses half of its capability to provide the simple repertoire of understandable instructions, and by changing them around you are able to decide what you want the system to do. It is a preprogrammed computer, but it can take you to many places. You can retain the flexibility that you need.

The TC500 has already been delivered. The next model that I draw to your attention has not yet been delivered but you may know of it. It is the Viatron System 21. Again the programming is done ahead of time. Again the program accepts as input a series of point, unit, unconditional instructions. And again, you can make your system flexible and different from that of the man next door. You can change your system when you want just by changing the phrasology. That has not yet been delivered, but it can be seen at the different shows in the form in which you will see it.

A Memory Man's Ideas

The last one that I draw to your attention is the system of memory control memory, and so on, such as the Imsc of America's Computer 2000. In this is the major route for the future. At the Spring Joint Computer Conference, he told CW that this was the area that was coming on strongest. He should know. He was building memories for many years before he started his own series of companies and he still a memory man at heart. He says that he would like to be able to talk to a computer which wants the application, want on a general purpose machine and use that as a definition of your need. Having defined your need in a machine readable form, you will be able, with today's technology, to take that and use it to weave your special purpose computer.

They Can Be a Challenge

If any of these items work out, then special purpose computers can be produced economically, run more flexible programs, and handle those applications which have already been purified. To assume that special purpose computers are going to stay in their own back yard and claim that the general purpose computer is a computer that can only be based on history but no longer on technical facts. It is therefore a dangerous assumption for computer people to make.

GUIDE TO NEGOTIATING A COMPUTER CONTRACT

This handy guidebook was prepared by Robert P. Bigelow with the assistance of the Computerworld editorial staff and contains what you should know when entering a purchase or rental agreement for both hardware and software.

There are chapters on the elements of contract law; terms and conditions applicable to the purchase and/or rental of automatic data processing systems; management's responsibility for the total operation — not just the hardware; a computer contract checklist; and a comprehensive bibliography.

40 pages, soft cover, \$5.00. For your convenience, clip the coupon below.

Please send me _____ copy(ies) of GUIDE TO NEGOTIATING A COMPUTER CONTRACT at \$5.00 each.

Name _____ Company _____

Address _____

City _____ State _____ Zip _____

Return to: Dept. RJ, Computerworld — 60 Austin Street, Newton, Mass. 02160

If you earn 10K-a-year and spend more than 130 seconds a-week looking for your boss' copy of Computerworld,



you're wasting his money.



COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

60 BOSTON STREET, NEWTON, MASSACHUSETTS 02165 • TELEPHONE: 617/252-9800

Yes, please send me COMPUTERWORLD for . . .

1 Year \$ 9.00
 3 Years \$20.00 Bill Me
 Payment Enclosed

| | | |
|------------|---|--|
| AR | Name | 49 |
| Your Title | 78 | 78 |
| Co. | 87 | 87 |
| Name | 1 | 1 |
| Address | 35 | 35 |
| City | 51 | 51 |
| Zip Code | 2 | 6 7 8 15 16 17 18 19 20 21 22 23 24 25 26 27 |
| Return to: | COMPUTERWORLD 60 Austin Street, Newton, Mass. 02160 | |

Please Circle 1 Number
and 1 Letter:

YOUR TITLE AND/OR
FUNCTION?

A. Operational/Management
B. Computer Professional/Staff
C. Corporate Officers
D. Executive/Administrative
E. Engineering/Scientific
F. Production/Maintenance
G. Sales/Marketing
H. Other _____

COMPANY BUSINESS:

1. Mining or Construction
2. Manufacturer/Computer
3. Manufacturer/Other
4. Utility
5. Wholesale/Retail
6. Service
7. Consultants/DP Services
8. Business Service (except DP)
9. Educational/Religious/Legal
10. Government/Military
11. Other _____

When you consider that Computerworld costs only 17.3¢ per issue with a one-year subscription, it doesn't make sense for you to spend your time looking for someone else's. Especially your boss'.

Ok, you say, you don't spend two minutes looking for Computerworld each week. The secretary drops it off at your desk when your name comes up on the list.

But how old is your copy when you get it? A week? Two weeks? If it's more than two days, you've defeated our entire purpose in life: to bring you the news of the computer world as it happens. Just as a minute later, in fact, we'll be the only publication that does this—the only weekly for the EDP field. But you know a lot about us already. After all, you're reading Computerworld right now.

We're sure that a current issue of Computerworld will help make you more efficient each week. So do us both some good. Tell your boss that he can save money by letting you fill out the coupon below. If you are the boss, now is the time to tell it yourself. Just drop in the name of your company and attach your Computerworld routing list. We'll see that everyone on the list gets his own copy. It'll be two minutes well spent.



COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

60 BOSTON STREET, NEWTON, MASSACHUSETTS 02165 • TELEPHONE: 617/252-9800

SLAY the many headed dragon

CROSSTABS

STATISTICALLY POWERFUL PACKAGE, REPORT-ORIENTED, EASILY LEARNED, AND REQUIRING NO PROGRAMMER

WHAT IT IS

NEEDS NO PROGRAMMER . . . HAS MANY APPLICATIONS . . . EXCELLENT REPORTING TOOL . . . CROSSTABS . . . for date extraction, analysis and reporting . . . the most powerful and flexible cross-tabulation package available for the IBM System/360.

Users in finance, research, personnel, marketing or operations management, who need not be programmers, automatically create special programs designed to current reporting needs . . . through simple control statements. Each CROSSTABS run then produces statistical reports, appropriately titled, labeled, and spaced, in easily readable cross-tabular format.

WHY IT'S BETTER

NO CHANGES NEEDED . . . LEARNED IN 3 HRS. CROSSTABS requires no changes to current programs, operating time, Report-oriented, designed to direct use by the individual who needs the final information is important. For this reason, no control statements are simple enough to be mastered by a nonprogrammer within three hours. Yet it is flexible enough for expression of highly complex data retrieval and manipulation operations.

WHAT IT DOES

OPERATES ON ANY INPUT FILE . . . IDEAL FOR SURVEYS . . . 21 STATISTICAL FUNCTIONS . . . HANDLES BAD DATA . . .

CROSSTABS operates on any type or format of data file, computes relative frequencies, indices, pertinent statistical measures. Processes all types of complex weighting factors and automatically produces neatly labeled reports.

Along with its capability to produce multidimensional cross-tabulations of any degree of complexity, CROSSTABS offers great efficiency in the use of core storage and machine time.

Twenty-one frequency and percentage options for calculation and display are provided by CROSSTABS. An important feature is CROSSTABS's ability to recode data at the same time it processes a file. In addition, procedure exist for handling records with missing or invalid data.

WHAT IT COSTS \$260/MO. Short-term rental starts at \$260 per month with attractive purchase option credits earned toward a purchase price of \$4,500.

Developed and Maintained by



CAMBRIDGE
COMPUTER ASSOCIATES, INC.
CAMBRIDGE, MASS. 02139

Through our national network of sales representatives we are capable of consultation with many of your software problems. Please feel free to contact us with a software problem of any sort. We'll be pleased to work with you in its solution.

DU Data Usage www.datousage.com
Computer Software Architects
PORT LEE, NEW JERSEY 07024

AVAILABLE FROM:
BOSTON
IBDS
COMPUTER SOFTWARE CORP.
15 School Street, Boston, Mass. 02108-1517/227-0534

A BOSTON COMPUTER GROUP COMPANY



DOCUMATIC®/ for 360 RPG

WHAT IT IS

Text Processing Documentation — English language documentation, not code; understandable programs, not questionable jargon; a programming application completed, not a job in the works now occurring at scores of locations.

Run Books . . . DOCUMATIC users have utilized the system to train junior programmers after with the English language description of what they have written.

Card Applications — DOCUMATIC output is used today as the basis for run books; run books that get away from scraps of paper and an operator or programmer's memory.

Conversion Aid — DOCUMATIC users are upgrading their computer programs at a cost which is even below possible. Card applications are being converted to tape and disk so rapidly that complete conversion has been accomplished before hardware delivery. Users upgrading to Model 26's and 30's have gone from RPG source to COBOL source in a matter of days.

Accurate Documentation — Installations have been able to replace their original system specifications with a DOCUMATIC system run to produce an accurate update of their system of their application. This greatly protects their management with the security of knowing that the job can go on, even when their Data Processing Manager finally takes his vacation.

WHY IT'S BETTER

Standard Documentation — The knowledge that it is no longer necessary to decipher manual documentation and the fear that the documentation we lost are no longer present in DOCUMATIC installations. Accurate documentation is needed all the time and it is required to three minutes of computer time.

Updating Less Error Prone — DOCUMATIC users have eliminated the costly reworking of updated production programs. Programs such as update and conversion are being run on the system, which RPG does not detect are vividly pointed out by DOCUMATIC before a program goes into production.

Minimum Documentation Costs — DOCUMATIC users have realized substantial dollar savings in program maintenance because of the availability of superior documentation. Program modifications are being effected 100% faster. Future maintenance will be as easy as possible.

Audit of Programs — Financial management and corporate auditors can breathe easier at a DOCUMATIC installation with the ability to readily read English descriptions of the contents of RPG financial disbursement programs.

Encourages Standard — Uniformity of file names, date descriptions and modular programming are indispensable in any data processing installation.

Ensures Standard — Uniformity of file names, date descriptions and modular programming are indispensable in any data processing installation.

WHAT IT DOES

Program Optimization — DOCUMATIC users are modifying their RPG programs to provide faster throughput and smaller programs. They've been able to accomplish this through DOCUMATIC which produces output in RPG or the RPG compiler (pointing the way to optimal program modifications).

Debugging Aid — DOCUMATIC users are saving thousands of dollars a year in using this system to DEBUG their programs. RPG completions are being run on the system, which RPG does not detect.

Encourages Standard — Uniformity of file names, date descriptions and modular programming are indispensable in any data processing installation.

WHAT IT COSTS \$40/MO. Short-term rental starts at \$40 per month, with attractive purchase option credits earned toward a purchase price as low as \$1,800.

Developed and Maintained by

UTILITY-CODER/360

FOR THAT WORK YOU DIDN'T PLAN FOR . . . HAVE NO BUDGET OR STAFF FOR . . . AND THEY WANTED YESTERDAY!

WHAT IT IS

SIMPLE . . . EASILY LEARNED . . . SUITED TO "ONE-SHOT" AS WELL AS "REPETITIVE JOBS" . . .

UTILITY-CODER/360 is the easiest and most flexible language for improving use of the IBM System/360 in a wide range of data processing applications.

Its language consists of English words, abbreviations, and a few symbols . . . each element of which is basically self-explanatory and easily remembered. It can be quickly learned and easily used by inexperienced as well as veteran programmers.

WHY IT'S BETTER

QUICKLY PROGRAMMED . . . FAST EXECUTION . . . FEWER RE-RUNS . . .

UTILITY-CODER/360 is already in widespread use and the results are impressive. The cost of running programs has been reduced dramatically. Re-runs have been cut substantially. Efficiency of operation has improved significantly. On particular jobs, current figures show savings running as high as 90% versus conventional-type software systems.

WHAT IT DOES

FILE MANAGEMENT . . . DATA MANAGING . . . REPORT WRITING . . .

AND CONVERSION . . .

UTILITY-CODER/360 has broad capabilities for performing many types of file management, retrieval, and conversion operations, as well as report writing. It provides quick and accurate control for creating, maintaining and editing data on any medium; Retrieving subsets of files that satisfy tests of any complexity; Generating printed reports or summaries in any format; Converting to System/360 from any other computers; Algebraic computations; Converting data from one representation to another (character, packed, binary, hexadecimal).

WHAT IT COSTS \$180/MO.

Short-term rental starts at \$180 per month with attractive purchase option credits earned toward a purchase price of \$3,500.

Developed and Maintained by



CAMBRIDGE
COMPUTER ASSOCIATES, INC.
CAMBRIDGE, MASS. 02139

Poison Control Center Is Computerized by Doctor

KANSAS CITY, Mo. — The lives of many people, particularly children, may be saved as a result of work done by Dr. George Green, Children's Hospital, in computerizing the lists of poisons, their symptoms, and their antidotes on a time-sharing terminal.

Always Emergencies

"Poison cases are always emergencies, and minutes lost in trying to identify the proper antidote can mean lost lives," Dr. Green told *Computerworld* in discussing the reasons for developing the system.

He also pointed out that when the hospital was a teaching hospital, the system was a great aid in teaching toxicology to nurses and interns.

I developed the system par-

tially as a means for self-preservation," Green said, "just to get a little sleep. My calls for night emergencies have been cut down to about 10 percent, perhaps to two or three per week now that the system is working."

The development of the system included hiring a full-time clinical toxicologist at Mercy, the establishment of a poison-control center within the hospital.

A direct computer connection between the emergency room and the computer takes many precious minutes when a child is brought in for treatment.

The system now contains all pertinent information about the 300 drugs most commonly found in the home.

The system is to include information about the 1,000

most commonly used household products, such as bleach, cleaners, and cosmetics.

To compile this list, Dr. Green has toured several supermarkets and made lists of products sold. The system can eventually handle about 30,000 items.

Not Computer Alone

"The computer doesn't rule out clinical judgment or laboratory findings. It remains for the house physician to evaluate the seriousness of a case. The computer just saves time. The quicker a poison victim receives treatment, the more likely his life will be saved," said Dr. George Wise, director of Mercy's poison control center.

According to Dr. Henry Verhulst, director of the National Clearinghouse for Poison Con-

trol, "53% of the ingestions of chemicals and 42% of the fatalities involved children taking overdoses of medicines. Most of these children were under five years old."

Simple Access

To make use of the system, a nurse simply types in the suspected name of the poison. Within a minute, the computer types back all the relevant information.

In complex cases, Dr. Green has a laboratory for clinical analysis of the ingested poisons, and he uses the computer to facilitate his analysis.

Toxicologist Important

Pointing out the continuing need for a full-time toxicologist, Dr. Green told *Computerworld*

about a case in which a child received an overdose of an insecticide carelessly left in a milk carton in the home refrigerator. Dr. Green was called, and he prescribed a massive dose of an antidote.

The antidote, atropine (originally used as an antidote for nerve gas poisoning), was administered to the child in time. Only specialized experience could have accounted for such action.

Expansion plans for the next year or so include installing terminals in other parts of the hospital, most of which have already been using the system by telephoning the emergency clinic.

If discussion of computerizing other poison centers continues, Dr. Green told *Computerworld* that Mercy might become the central clearinghouse for several such hospitals in nearby states.

Big Fish Story

WALTHAM, Mass. — Compaq Corp. recently found that computer advertising yielded remarkably straight results. In response to an ad headed "Rapidly growing pond seeks big fish," the firm got 100 responses and successful hired the marketing manager it wanted — Stephen M. Fisch.

Codan forgave him the difference in spelling.

Contract Details, Development Covered in Guide

NEW YORK — A contract development guide recommending what contractual arrangements should be put into contracts has been developed by Adapso, the industry organization for computer bureaus.

The booklet, "The Industry Guide of Contract Development," was prepared by Milton R. Wessel, Adapso's counsel, and Ray Herrick, counsel for Fisher-Stevens, Inc., a Clifton, N.J., service bureau. However, it is not intended to be a legal document. J. L. Dreyer, Adapso executive vice-president told *CW*, but is rather a guide for determining what should be covered in contracts.

Details of contracts are covered, including ones between companies and clients and between companies and their employees. The booklet is divided into four major sections: Contract Setup, Statistics, Legal Narrative, Court Experiences, and Contract Samples.



The computer world discovers the fast-talker

33% bonus from hands that feed computers

Talk about fast-talking a computer. Data entry never had it so good... or keypunch operators so easy. Your operator simply enters data via an electronic keyboard and it is banked immediately in an inexpensive base — a magnetic tape

cassette. In short... she talks to your computer on tape, at a portable station, at speeds up to 1000 cps, or up to 333, over keypunch entry. She can right or left justify and blank or zero fill with ease... she can auto dup, and dup and auto skip. And much more. Records may be read or written in any order, of variable length without restriction. Dropped records can be inserted or errors corrected during verification.

Cassettes are later converted to 1/4-in.-high inch computer tape which is read at 800 bpi and interchanged on seven or nine-track tape drives.

The data entry system has instant, logical compatibility with your present system. And it can negotiate the sizeable data entry cost savings over keypunch. Write for new brochure, "A New Generation of Data Entry."

from the keyboard-to-cassette company



COMPUTER ACCESS SYSTEMS
3050 West Garfield, Dept. 71, Phoenix,
Arizona 85017 (602) 279-5591



June 25, 1969

Page 15

EDP School Problems Are Discussed by Educators

By Patricia Coffey

What type of education is available for those interested in the data processing field?

What are the schools? How important are they?

What are the problems?

What is the future?

These are some of the questions we asked educators in the data processing field.

Most feel that schools, private and public, vary greatly in educational quality.

Each school must be examined individually, including qualifications of faculty and nature of curriculum and data processing equipment.

Special training of particular importance for data processing workers seems to lie in communications, logic, mathematics and psychology.

Most educators feel that "the more education the better."

However, they stress aptitude to the extent that if an individual has an aptitude for programming and will have a college background, he should be given a chance to prove himself.

The key problems in the field are recruiting competent staff and having sufficient access to equipment.

"It's difficult to have a good course because of the serious problems of getting competent teachers," said an education director of a private school. "Because they are competent," he added, "there's a demand for them from large high-paying companies."

Norman F. Kalaus, chairman of the College of Business Administration at the University of Illinois, said, "A data processing student should have a knowledge of the computer and its capabilities."



Drawing by Shirvanian; © 1969

The New Yorker Magazine, Inc.

Achievement Exam in Computers and Data Processing Designed

Business and industrial firms, along with two- and four-year colleges, will be interested in an achievement examination in Computers and Data Processing recently developed by the College-Level Examination Program.

The CLEP Subject Examination in Computers and Data Processing is designed to serve the business and industrial needs to use when screening trainees applicants for computer programming positions. It measures an individual's mastery of the basic material on data processing hardware, software, programming and procedures, usually covered in an introductory college-level course of one or two semesters.

Examination questions are designed to measure understanding and application of the elements of data processing and data data processing. The examination assumes an understanding of terms commonly used by data processing practitioners and a general familiarity with the hardware and software most commonly supplied by major equipment manufacturers. It does not, however, emphasize details of hardware design or of advanced quantitative or programming techniques required to the use of the computers.

The terminology and symbols in the tests conform to the standards set by the USA Standards Institute.

The examination consists of approximately 100 multiple-choice questions to be answered in 90 minutes. Most candidates will be able to read and consider all of the questions in the allotted time; few, however, are likely to answer all of them correctly. It is expected that average candidates will be able to answer about one-half of the questions correctly.

The questions in each segment can be classified under the eight major headings listed below. The approximate percentage of the

total number of questions allocated to each listed topic is shown in the right-hand column of the table.

| | |
|---|----------|
| 1. Punch card equipment and processing methods |10% |
| 2. Computer equipment and functions |16% |
| 3. Data representation and central processor functions |12% |
| 4. File organization and processing |10% |
| 5. Data processing system |10% |
| 6. Elements of computer programming |20% |
| 7. Program modification and input/output programming |12% |
| 8. Problem-solving and control of operations in data processing, and management of data processing function |10% |

There is also an optional 90-minute essay section containing five questions and designed to cover the same subject matter as the multiple-choice examination. The emphasis in this section is on the ability of a candidate's ability to select, organize, and fully, yet concisely, express his knowledge.

A short form of the Subject Examination in Computers and Data Processing, "Test in Computers and Data Processing," will be available in July. The examination has already been normed against more than 3,000 students in 41 colleges throughout the United States who took the examination during the year following their elementary courses in computers and data processing. Consequently, given a score on the Subject Examination in Computers and Data Processing, it would be possible to use this examination to anticipate with reasonable accuracy the grade which an individual would make in an elementary course covering similar material.

The examination was developed for the College-Level Examination Program of the

College Board by the Educational Testing Service, Princeton, N.J. The general specifications were designed by Fred Gordon S. Dorn, of the University of Minnesota and served as the base for the examining committee, which was composed of Donald H. Sanders, Texas Christian University; James E. Adams, M.I.T.; James L. Gandy, University of Michigan; Jim Luta P. Eaves, Texas Technological College; Wayne P. Laurents, St. Peters-

burg Junior College; and Edward J. Laurie, San Jose State College.

This examination, as well as all other examinations in the College-Level Examination Program, will be given during the third week of each month at one of the CLEP centers located in larger urban areas throughout the United States. It may be administered to groups of students institutionally and, if necessary, other special arrangements for the examination may

be made.

The fee for taking the examination is \$15.00 and the institutional fee is \$5.00.

Further information about CLEP, including the Subject Examination in Computers and Data Processing, may be obtained by writing to the College-Level Examination Program, College Entrance Examination Board, 475 Riverside Drive, New York, N.Y. 10027.

Professional Societies Simultaneously Announce Guidelines for EDP Schools

Two professional societies have published, almost simultaneously, guidelines for data processing schools.

The organizations are the Data Processing Management Association and the Association for Computing Machinery. The DPMAs guidelines are much more detailed than ACM's, and although they seem, at first glance, to differ considerably, the concept of both are much the same.

The prime objective which ACM believes a data processing school should have is that of providing competency of sufficient depth, so that each graduate technician can be employed as a user or as a prime-time computer programmer trainee.

DPMAs lists their prime objective of schools as "to prepare students for entry level jobs as computer operator, punch card machine operator, computer operator, and computer programmer trainee."

The admissions policy on both are primarily the same. Prospective students should have the aptitude, motivation, and interest in the field before being admitted to the schools. They

both believe students should be tested and interviewed to determine this factor.

Singled out in DPMAs suggestions on faculty qualifications is the Director of Education. The DPMAs position is that the director of education must be actively involved in the educational function as opposed to administrative function. He should have a college degree or equivalent, and education and teaching experience. He should establish records which support the student list, and should evaluate and individually discuss the performance of instructors on a scheduled basis.

The prime policies of both organizations make no mention of this position.

The qualifications of faculty are about the same in both sets of guidelines. They mention that an instructor should be experienced in the field and have a college background of preferably four years - but two years is acceptable.

DPMAs guidelines stress that a recent graduate of a school cannot be an instructor until he meets the minimum work experience requirements, which are at least two years in the field.

Also highlighted by DPMAs is that the instructional staff should consist of at least 75% permanent personnel.

Curriculum consists of thorough coverage of the courses.

ACM stated that they feel instructional materials should reflect current occupational knowledge and practice.

DPMAs suggests that students use "hands on time" as often as possible.

Both societies stated that when measuring a student's progress, the successful completion of assigned projects, adequate application and procedure manuals and periodic exams and instructor evaluation must be considered.

They felt that students should be tested by actual running of the computer and should be able to understand concepts and assess assimilation of new information.

Students should have adequate access to computer equipment according to ACM guidelines. DPMAs guidelines state that students who follow DPMAs guidelines must write a minimum of four successful computer programs.



Sixteen high schools in Minnesota, Iowa, and Wisconsin were represented at a two-day computer workshop on the campus of College of St. Teresa, Winona, Minn.

\$25 or \$400 per Year?

Student EDP Costs Vary Widely

"There has been a plethora of successful experiments, but very few break out of their hot-house environment. There is a world of deficiency in terms for taking successful experiments to application in a large number of schools. The institutional structure of schools is almost ideally designed to resist change."

Arthur Oettinger is a Harvard professor, past president of the Association for Computing Machinery, and author of *Run, Computer, Run*. His statements, including the preceding one, brought strong reactions from other panelists of the panel. But they conceded that as much as a decade of research and development was necessary to bring current experiments into widespread application. And it is not clear where the money will come from.

"The education industry does not seem prepared to make a commitment on research and development," Oettinger said. Single-parent families in particular, he said, "They must be more than just a pipeline for manuscripts." But he was not hopeful about textbook publishers, concluding that "a more venal, profit-mongering group is hard to find."

Costs High

Research and development is not the only area of disagreement among the experts. Cost is another. "It is currently much too high for most school systems, but several panelists claimed that present cost is irrelevant. "It's like asking the cost of a TV set in 1939," declared Seymour Papert.

What are the current costs? Project Local, in which students use the computer only in their free time, estimates that it costs \$25 per student per year to offer students all the computer time they can use. This can be compared to the less than \$5 per student per year that most schools spend on all textbooks.

Project Local has a PDP-8/L with four on-line and three off-

line terminals in each school. Allowing students unlimited use of the computer, they found that it cost \$18 per student per week of terminal time. Based on a 40-hour week with 75% utilization, Project Local director Robert Haven estimated that one computer could serve 350 students and cost \$500,000 per year, or approximately \$5 per student per year.

Haven's estimate is based on the assumption that the computer is purchased and amortized over five years. His estimate of experience, is:

| | |
|---------------------|--------|
| computer cost | \$4230 |
| maintenance | \$3900 |
| supplies | \$150 |
| space | \$300 |

\$5850

Of the \$25 per student per year, half is purchase price, so if the capital cost can be sneaked into a teaching program, for example, the apparent cost drops to \$12 per student per year.

Using the computer for night school or during the summer could cut the \$25 per student cost to \$18, according to Haven.

Even if it is true that the add-on cost is high, teachers are being replaced. He also noted that two factors would raise initial costs: special teacher training and establishing a resource center. He said that the two special textbooks were needed by the students, despite the fact that several have been published.

Stanford professor Patrick Suppes gave cost estimates for two programs he is working on: one for teaching programming to high school students, and the other for teaching Russian without a teacher. His project with elementary school children has instruction costs about \$50 per year per student, he estimated.

Is Cost Relevant?

But is it relevant even to consider cost at this time? MIT

professor Seymour A. Papert declared that considering costs now is like asking the price of a TV set in 1939. The production would force prices down sharply. But Oettinger said that school systems are not like individual buyers of TV sets, and declared emphatically, "It won't happen in this market."

Other panelists disagreed.

Papert noted that Oettinger's book included a table with 1967 costs for time-shared terminals provided by seven different companies.

Papert said that he checked recently with the same companies and found that prices were down to almost one-third those given in the book.

But it may not be relevant to consider costs at all. Duncan N. Hansen of the University of Florida said, "I think after I think there will be so inexpensive that we will have gadgets all around and not know what to do with them." And Papert claimed, "The schools are going to install computers no matter what the cost is. The question is how we are going to make the best use of them."

Who Should Decide?

Who should decide how to use the computers, the computer people or the school? Each pointed at the other. Oettinger charged that the educators must decide what they want in computers. But George Peters, superintendent of schools in Westport, Conn., said, "We are new in this area, and that makes it hard for us to say what we want from computers. But I believe that learning is like saying, 'You are an expert on pencils. What should we do with pencils?'"

So priorities and goals are likely to be experiments, continue. Bringing these experiments to widespread implementation will require a decade of research and development, however, and it is not clear that the required research and development will be done.

Students Use Computers For Homework Assignments

(Continued from Page 6)

price of eggs, one multiplies 6 times 9, or line 1 times line 2). In this project, the child types "1,2 M". The solution to the problem is:

1,2 M 5) 54
3,4 M 6) 35
5,6 A 7) 89
7,X

The child types only what is in the left column; the computer does the rest. The "7,X" indicates that the child believes that

line 7) is the correct answer. The computer will tell the child whether this is correct or not, but will not comment on the method of arriving at the answer. The child, however, is allowed to find his own way to the answer, and is not forced to use one method as prescribed by a teacher or the machine.

In all of these experimental projects the child uses the computer to do the work, but is forced down a rigid path to suit the limitations of a machine.

Pupils Are Clamoring To Program Computers

"Kids love to program computers," declared Wallace Feuerrieg, director of Project Logo.

"A computer terminal has tremendous motivating power," said Robert Haven, director of Project Local. "Logo gets the children involved in the operation period to say, 'The excitement in my school is fantastic. The students are clamoring to use the terminals; they even come after school.'"

Teaching the Computer

Having the child in control of the computer has two important educational advantages, according to the panelists.

First, the student writes a program (Continued on Page 18)

COMMERCIAL COMPUTERS, INC.

7255 Ivanhoe Ave., La Jolla, California 92037 • (714) 464-7161
425 Broad Hollow Rd., Melville, L.I., NY 11748 • (516) 299-7772



When
you
have the
need to know
...you need to know now

That's what we thought at DI/An - so we designed a strip printer for use where the information can be best utilized - whenever you want to refer to it. It could be in a business or brokerage office, or perhaps at a nurse's station in a hospital . . . in fact, any place where a receive only terminal is the answer to a communications problem.

The quiet operation of this unit and its modern compact size make it pleasingly compatible with today's office equipment, and it features built-in illumination - and an easily readable tape with full message visibility.

DI/An's newest unit will accept either ASCII or Teletype Baudot Codes and prints a full (65) alphanumeric character set at 20 characters/second - 9 characters to the inch - in a new highly legible 1/4-inch-high character.

Need to know more - or want to discuss product applications? Write - Robert Gillett, Standard Products Manager or call him at (617) 288-7700 and ask for bulletin SP-2 . . . it will tell you all you need to know.



DI/AN CONTROLS, INC.

100 DUXBURY AVENUE, DUXBURY, MASS. 02332

PHONE: (617) 288-7700

THE PRO'S
YOU NEED READ



Computerworld

THE COMPUTER FOR THE COMPUTER COMMUNITY

Do Students Benefit Using Computers?

(Continued from Page 17)
gram for a problem solution, which means that he must "teach" the computer how to solve the problem. Haven noted: "The student gains all of the benefits of learning through direct experience, learns how to use the principle being studied and also obtains rapid feedback concerning the accuracy of his teaching; i.e., his program either runs or does not."

Second, the programming language gives the student a language to talk about the problem and to talk about his errors.

Do Students Learn More?

Several panel members cited impressive educational gains for children using computers. Forseti said that second graders showed a "striking improvement" in reading after three months with the computer.

Haven cited a class in high school algebra that was broken into three groups, all with the same teacher and same instruction. Students in the control group did their homework by the usual pencil and paper method. The first group did their homework by computer, and used this to do their homework. The third group was taught flowcharting and programming, and did their homework on the computer.

Before the first test in the course, the groups were tested in general scholastic ability and in abstract reasoning. The computer group improved more than twice as much as the control on the general scholastic aptitude test and almost four times as much on the reasoning test (See Chart).

% Increase in group mean
Comparative results showed
an improving abstract reasoning
and scholastic ability indi-
cated by the following table:

abstract reasoning scholastic ability

control 4.6 2.9

computer 17.2 7.5

But how significant are these results? One questioner wondered whether improvement in grades didn't simply reflect the increased individual instruction in the experiment.

Instruction Individualized

An important claim made for this sort of computer-aided instruction is that it is individualized; the student works at his own pace and by his own choice.

MIT Professor Seymour A. Papert charged that, "With a class of 30, a teacher must prevent diversity," but that computers represent a way of "overcoming diversity." In his experiments, children do not have to solve a problem in exactly the same way as the teacher, and may even work on totally different problems.

But can the individualization of computer instruction be maintained in a normal school environment? Harvard Professor Anthony G. Oettinger says "no." In his book *Run, Computer, Run: The Mythology of Education*, Oettinger claims that students cut the language labs were "the most glistening mark of educational technology" and promised individualization in language instruction. But in practice, he claims, it has not been done. He claims, citing as an example the language laboratory proce-

dure in the Watertown, Mass., high school which includes the statement: "No one is an individual in this laboratory."

Books promise the ultimate in individualization, note. Oettinger claims that "school libraries are scarce, cramped, and inaccessible to their intended users, the children," and most school librarians seem happier when the books are all neatly in their places on the shelves.

Printron Provides Record

Another advantage cited for the use of computers in education is that the printout provides a record of everything that the child did, so that the teacher can study it and find out exactly where the student is having problems.

Finally, panelists cited several psychological advantages for using computers in education. Papert said that by learning the concepts of bug and debugging, the children learn "a more constructive way of thinking and solving problems." He explained that when there is a mistake, rather than feel that he was stupid to make it, the child thinks in terms of correcting the error in order to make the program run or to the answer correct.

Sex by Computer?

Duncan N. Hansen of Florida State University noted that perhaps the most important educational advantage to learning, and that the interaction with a computer can be "far less punishing" than interaction with peers in some cases. He cited sex education, for example, in which this might be a problem that a computer could solve.

Computer May Have Caused School Racial Trouble

By Joseph Hankin
CW Staff Writer

Racial trouble at a high school may have resulted, in part, from the school administration's jump to computer-generated schedules without first considering their effect on the students.

In 1967, the school decided to switch to a modular scheduling for the 1967-68 school year. A modular schedule is a highly flexible one consisting of short periods (16 minutes in this case), team teaching, and large and small groups. It was too complicated to be established without the aid of a computer.

Modular scheduling places stress on independent study. Class time is cut by one quarter and students' free time is sharply impacted.

The computer output for the high school's first modular schedule did not provide a useful list of students who would not be scheduled to attend class during specific periods. As a result, no effort was made to organize required study halls. The result was chaos.

Students were completely free when they were not scheduled to be in class. As a result, the highly motivated students spent their free time in resource centers or libraries, while the others wandered around the halls or sat in the lunch room. The luncheonette next to the school increased its gross by \$100 a day over the previous year.

In theory, teachers will use some of their newly acquired time to work with underprivileged students. In practice, this failed to happen. A assistant principal said, "Our year of modular scheduling wiped out the C student. He either went up to an A or B, or dropped to a D or F."

"We lost complete control of both students and faculty," he admitted. Class cutting jumped, and the failure rate skyrocketed. He added: "In the school, the blacks sat on one side and the whites on the other," the assistant principal said. "Our year of modular scheduling segregated the school; it set back integration ten years," he added.

The first racial incidents came in the fall of 1967 in the newly segregated cafeteria. These involved just food throwing and were not considered serious. But that exacerbated the racial split. Racial trouble in the fall of 1968 were serious enough to close the school for several days. "Black pride and white backlash contributed," said the editor of the student newspaper. "But the exact timing of this was an important factor in both the segregation and the disturbances."

(Editors note: In exchange for their cooperation on this article, CW agreed not to identify the high school.)

Condensed Course In EDP Offered

COLORADO SPRINGS, Colo. — A highly condensed course to orient new people to the systems-analysis area of EDP is being offered by Systemation, Inc. here.

The course is designed to provide an intense exposure to the fundamentals of systems analysis and experience with solution of real problems.

Visual aids and proven teaching techniques will be employed throughout the ten-week sessions. Workshop projects are to be completed by attendees under the tutelage of trained personnel who are experts in systems analysis, according to the company.

The course consists of two parts. The first is a correspondence course which contains reading and written assignments. The second part is the workshop, which is intended to provide practical experience in using the tools studied.

British Computer Society Develops Qualification Exam

The similarity between the ACM and DMPA approaches to the problem of educational programmes for the industry should not obscure the fact that there are other alternatives.

One of the most developed programs that exists is run by the British Computer Society. Here they reorganized the society, and then set up a series of examinations, relying on the society to do the work rather than passing on the responsibility to various schools.

The examinations provide the applicant with two compulsory papers plus a number of optional ones. This is not as bad as it may sound because the two compulsory papers are allowed to choose the questions out of ten, so he has a fair amount of leeway. The two are both general, and normally have essay type answers, as in question 3 in general paper II shown below.

This questions asks, "What benefits are available to the programmer who uses a problem oriented language?" The society expects an intelligent discussion of the problem, not a specific set of answers. These exams have the interesting result that they are graded by hand rather than by a computer. There are no multiple choice type questions.

Perhaps the British Computer Society thinks that it knows enough about computers not to be prepared to entrust the marking of programmers' examinations to their inflexible methods!

The following are specimen papers for the Society's Professional Qualification Examination:

GENERAL PAPER I

Not more than SIX questions to be attempted. Time: 3 hours.

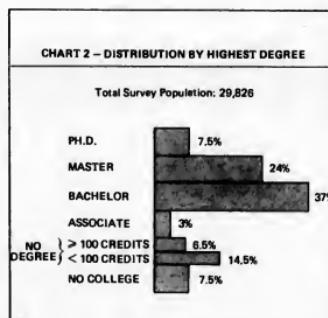
1) a) Given a fixed word length of 24 bits, describe a method of storing 8 decimal alphanumeric characters? What kind of facilities are desirable for manipulating and processing such data?

Exam No. 304

The following are specimen papers for the Society's Professional Qualification Examination:

Chart Shows Degree Distribution

Societies Run Survey on EDP People



Principal societies in information processing received contract support from the Department of Defense Advance Research Projects Agency to conduct a survey about information processing personnel and to process and publish the results.

One objective of the survey was to obtain data characterizing the professional make-up of members of the participating societies. Some data, they felt, should be representative of professional categories, activities, and other factors of employment in the field of information processing.

The other objective was to make the results of the survey available to the membership and the general public through the media of the participating societies.

The chart shows the distribution by level of highest degree of respondents surveyed.

Discuss the advantages and disadvantages of using floating point arithmetic.

5) a) Describe, with the aid of a diagram, the basic structure of a simple computer. Outline the flow of information when executing the following instructions which are in two-address form

- i) "Add store to store";
- ii) "Jump if store positive".

b) What considerations influence the choice of word length in a fixed word length binary computer?

6) A motorist selecting a vehicle considers the following factors

purchase price; economic fuel consumption; high speed capability.

He specifies that the car he will purchase must satisfy *at least one* of the following criteria

- i) cheap and slow;
- ii) low fuel consumption and cheap;
- iii) fast and expensive;
- iv) low fuel consumption but slow;
- v) fast but high fuel consumption.

Prepare a Truth Table, a Venn diagram and a Boolean expression to represent his requirements. Restate his requirements in a simpler form.

7) Outline the development of computer applications in the past twenty years with particular reference to ONE sphere of industry, science or commerce.

8) a) What factors affect the time taken to access a block of information held on a magnetic disc?

b) A magnetic tape system has the following characteristics

| | |
|---------------------------|---------------------|
| length of recordable tape | 2,000 feet/reel |
| pack density | 200 characters/inch |
| intertrack gap | 0.15 inch |
| start time | 0.006 second |
| stop time | 0.004 second |
| block length | 1,000 characters |

Calculate

i) The total number of characters on one tape reel.

ii) The time to traverse from the beginning to the end of the tape (assume that the tape stops at each block gap and ignore processing time).

9) Four binary signals, A, B, C, D, are available.

The three signals, A, B, C, represent an octal digit.

The signal D is a control signal.

An output signal X is required when signal D is 1 and ABC represent 2, 3, 6 or 7, and when signal D is 0 and ABC represents 2 or 3.

Sketch a logic diagram using AND, and NOT elements to produce the signal X.

10)

Discuss the role played by analogue computers in the simulation of industrial processes

GENERAL PAPER II

Not more than SIX questions to be attempted. Time: 3 hours.

With reference to an appropriate simple example of your choice, illustrate the main steps in the analysis of a problem for computer solution and discuss the construction and use of flowcharts.

2) Explain carefully *three* of the following programming concepts

- a) the stored program;
- b) transfer of control;
- c) open and closed subroutines;
- d) modifier registers (index registers) and counters;
- e) absolute and relative addressing

3) What benefits are available to the programmer who uses a problem-oriented language? What further benefits should the programmer obtain from dialectic facilities associated with the compiler for the language? Why are these benefits not usually available to a user of programs in machine language.

4) Discuss the extent to which the listing of a program is adequate documentation of that program. What additional documentation might be required by the originator

(Continued on Page 20)

COMPUTERS FOR SALE

1. 1401 C 34K.....\$39,500.00
2. 7330 Tape Drives - Quan. 8 Immediately
3. 1401 C 4 (8K) System will take 729 Drives (IBM M/A available on above)

COMPUTER WANTED

1401 Systems wanted now, or will purchase now and lease back for later delivery.

UNIT RECORD FOR SALE with IBM M/A

1. 407 A-1, 407 A-2, & 407 A-3
2. 402 A-1, 403 A-1
3. 082 ss Aux. or 083's
4. 519 10 pos. punch feed mark sense

IBM UNIT RECORD WANTED

NEED IMMEDIATELY, Keypunches, Verifiers, Collectors, Sorters, Reproducers, and Interpreters with or without IBM M/A

IBM UNIT RECORD FOR LEASE

1. 407 A2 30mo. lease/purchase @ \$600.00 IBM M/A
2. 402 A1 24mo. lease/purchase @ \$300.00 IBM M/A
3. 403 A1 24mo. lease/purchase @ \$325.00 IBM M/A



DAS AUTOMATION SERVICES, INC.

4856 CBSB ROAD DBILLB, TEXAS 75247

BC 214 637-6570

Error Bounds Are Featured in British Computer Society Exam

(Continued from Page 19)

of the program (who may wish subsequently to extend the program) and by a library in which the program is lodged?

5) What is understood by an iterative process in numerical computation? Why are such processes particularly well suited for use in computer programming?

Derive an iterative process for extracting cube roots and draw up a flow diagram which could form the basis of a computer program. Starting with an initial approximation to the root, the theoretical convergence of your method, the proposed criterion for detecting convergence within the computer, and the provision of error exits from the program.

6) A square matrix is said to be upper triangular if all its non-zero elements lie on or above the principal diagonal. Write out in full the equations represented by Δ , $\mathbf{x} = \mathbf{b}$ where \mathbf{A} is upper triangular of order n , \mathbf{b} , \mathbf{x} are vectors and \mathbf{A} is unknown. Show that these equations may readily be solved provided that the diagonal elements of \mathbf{A} are non-zero, and draw a flow diagram for this process.

7) a) If 10 per cent of the bolts produced by a certain machine are defective, find the probability that, out of four bolts chosen at random, at most one bolt will be defective

b) What is understood by 'time series'? Show, by means of diagrams or otherwise, what is meant by 'long-term trend', 'cyclical movement' and 'seasonal movement'. Describe briefly the method of moving averages for the estimation of trend.

8) What is understood by 'mathematical model'? Illustrate your answer by formulating mathematically the following problems:

a) N customers each order specified amounts by weight of each of M products. The cost of delivering unit weight of a given product to a given customer is known. What is the total cost of supplying all the orders received?

b) A certain firm manufactures two types of cloth and uses three different colours of wool. It has available specified total amounts of each of the wools. Find the amount of each of the wools required in order to produce unit length of each of the cloths is

known. The profit made per unit length of each of the cloths is also known. The profit per unit length of each of the cloths should be made in order to maximize the profit?

Indicate briefly how you would solve problem b).

9)

A company is intending to use its computer to keep records of each of its large number of employees. Among other things, the following information is required in respect of each employee: full name; address; date of birth; sex; marital status; the department of the company in which the employee works; type of employment; current basic wage or salary.

Discuss briefly the way in which you would create a record in respect of each employee. Assume that the computer has a punched card input and a large magnetic tape backing store. Indicate how to produce a distribution, by year of birth, of male employees of the company.

10)

Fixed point arithmetic is being performed in eight-bit registers with two binary digits after the point. For the following expressions assume the numbers are binary and give the results which would appear in a register after the specified operation

- a) $1011 \cdot 11 + 10 \cdot 01$
- b) $101 \cdot 10 + 10 \cdot 10$
- c) $101 \cdot 11 - 10 \cdot 10$
- d) $101 \cdot 11 + 1 \cdot 10$

Calculate the absolute and relative error involved in the representation of each result. Give the bounds on the absolute and relative error produced by truncation when using these registers in this way.

OPTION B: PROGRAMMING

Answer ONE question from Section A and THREE questions from Section B.

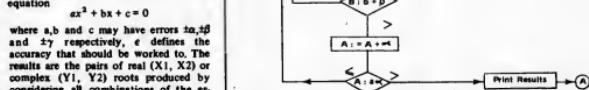
The answer to the Section A question will carry 50 per cent of the marks for the paper. Time: 3 hours

Section A

1)

The flowchart at right describes a method of solution for the quadratic equation $ax^2 + bx + c = 0$

where a , b , c may have errors $\pm a\delta$ and $\pm b\delta$ respectively, δ defines the accuracy that should be worked to. The results are the pairs of real (X_1 , X_2) or complex (Y_1 , Y_2) roots produced by considering all combinations of the errors.



a) Using a generally recognised high level language, write a program for this process.

b) Give precise details of your input and output layout.

c) Describe carefully what diagnostic aids you would use to test the program.

d) Give the exact forms of the test

data you would use and the expected results together with reasons for using each set of test data.

e) The results given by this program are not generally exact. Give a flowchart for a process which will take the present results as input and produce as output the range of each root.

(Continued on Page 21)

Computer Companion #788



New TAB Data Display Desk. Who says computers must be ugly? This strong series 500 Data Display Desk is a real computer system, featuring a CRT unit, microfilm readers, or whatever you want done with style and efficiency.

TAB
PRODUCTS CO.
535 Battery Street,
San Francisco, Calif. 94111

light gray formica with dark gray trim. Desk top and front edges are bevelled to protect sharp edges and 45° and 85° monitor angles. The CRT unit is designed for CRT units, microfilm readers, or whatever you want done with style and efficiency.

Modules Computer Course Offered

JACKSONVILLE, Fla.—Computer Languages Corp. now offers computer courses in modules, permitting students to begin instruction at more frequent intervals at a newly opened branch school at Miami at 2138 Biscayne Blvd.

According to Richard A. Calhoun, president of the Jacksonville-based Computer Instruction Center, this approach will also permit refresher courses in particular modules without the necessity of enrolling in the entire course.

Actual operation of a variety of makes and sizes of computers, utilizing "hands-on" instruction, will be taught in the Miami school.

The school will offer courses in disk and tape computer systems, as well as courses in a number of different computer languages. Instruction in the repair and

maintenance of equipment will not be required (frequently the case in manufacturer-operated schools).

"Instructor standards for Computer Languages Corp. require a four-year college degree plus minimum of three years of data processing experience for all instructors and directors," Calhoun said.

The computer-instruction school will also schedule special courses for business interests in families and their personnel with computer systems. Short courses aimed at understanding and communication between management and programmer will also be offered, according to Calhoun.

Computer Languages Corp. is a wholly owned subsidiary of Computer Controls Corp., a Miami-based time-sharing company.

British Exams Give Applicants Choice of Questions

(Continued from Page 20)

2) The first phase of a stock control suit is a program which reads stock cards (which have been previously sorted into stock number order) and creates a master file of master records on magnetic tape (or disc). The stock cards contain: stock number – identification, code -0 for new stock, 3 for deletion; description of line; reorder level; maximum stock level.

The master file record contains: stock number; number in stock; description of line; reorder level; maximum stock level.

Design the card and record layout and write, in a generally recognised high level language, a program for the procedure described in the flowchart below.

Section B

3) Using the two-complement form of number representation, explain how 'floating-point' differs from 'fixed-point' and indicate the advantages and disadvantages of employing the former method. Explain what is meant by 'normalised' in the context of floating-point arithmetic when the mantissa is stored in

- a) hexadecimal groups,
- b) octal groups,
- c) binary.

4) On a computer with multi-programming facilities, programs with low CPU and high peripheral usage should be run in the top priority level.

Explain this statement and comment on its validity. What is meant by a computer being 'peripheral-bound'?

5) If you were given the task of writing a main-store dump routine what features would you incorporate (assuming there are no hardware restrictions on your suggestions)? In what circumstances would you expect it to be used?

6) Describe the principal features of a general operating system for a machine configuration which includes at least one type of packing store, e.g. a drum, magnetic disc or magnetic tapes, a line printer, a line printer basic input device, e.g. card reader or paper tape reader, and a console typewriter.

Within the framework of this operating system describe the system commands you would use to enable you to compile and execute a program which is modular in structure and which is written in either a scientific or business oriented language.

7) Give a detailed flowchart describing EITHER an internal 'shuffle' sort OR a polyphase tape sort.

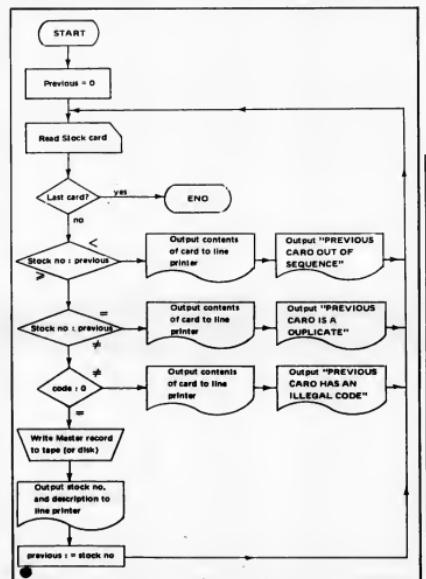
Describe in words (and with diagrams if required), using a suitable list of numbers, how the sort process works.

8) Write an essay on one of the following

- a) time sharing;
- b) multi-programming;
- c) multi-slices;
- d) list processing;
- e) on-line interactive systems.

OPTION C: DATA PROCESSING

Answer FOUR questions from Section A



and ONE question relevant to your specialist subject from Section B. Time: 3 hours.

Section A

1) Discuss the problems connected with the use of variable length records on magnetic tapes and discs. In what circumstances might you choose to use variable length records?

2) Explain the concept of an 'addressing algorithm' in connection with direct access storage. Give one particular example by way of an illustration. Explain what is meant by a 'bucket' and discuss the 'overflow problem'.

3) Describe a basic process of forming ordered strings and merging them. Show how these processes are employed in any particular magnetic tape 'sort package' with which you are familiar.

4) List some principal forms and charts used in systems documentation. Give a detailed description of any two.

5) Describe the functions of the following items of punched card equipment

- a) sorter;
- b) collator;
- c) tabulator;
- d) calculator;
- e) summary punch.

6) Compare the facilities offered by the TELEX, DATEL 200 and DATEL 600 services. Describe the equipment usually associated with the use of on-line data transmission.

7) Write short notes on any THREE of the following

- a) decision tables
- b) picture clauses and report editing
- c) magnetic tape file security
- d) magnetic card ledger accounting machines
- e) OCR readers and fonts.

Section B

Describe in outline a commercial computer application known to you. You should include a systems flowchart showing the organisation of the job in computer runs, describing each run with brief details of the input, output and files used. You should also list the criteria used in justifying the implementation of the system on a computer.

9) Set down the factors which you would need to investigate and evaluate in deciding on a computer configuration for an organisation.

10) Describe KWIC indexing and citation indexing. Discuss their comparative merits.

11) If you were asked to set up an information retrieval service within an organisation, describe how you would set about ascertaining the information requirements of the organisation and discuss the criteria which would influence your choice of abstracting, indexing and classifying methods.

12) Describe in outline the features of a large-scale computable model known to you in the field of either engineering or business or economics. Use the model you have described to elucidate the general philosophy of modelling.

13) In what circumstances does an interactive programming system appear particularly attractive to the user and why? Illustrate your answer by reference to a system with which you are familiar.

14) Describe the facilities of a general survey analysis program with which you are familiar and describe an application of it.

15) Discuss either textual analysis by computer or the use of the computer in urban planning.

"SECURITY 101"

A One Lesson Course in Computer File Security

PRIVACY
SECURITY
INDIVIDUALITY
CONVENIENCE
ECONOMY

The Basic course. With the writing on the board; the answer on the lecturer. Data Lock. Individual computer file security in or out of cabinets or safes. Available for wrap-arounds; also in Data Lock Canisters (1200' and 2400') and Data Lock Disk Packs.

For full course credit, write today for descriptive brochure. It's more than elementary. It's an open and shut file for individual as well as corporate peace of mind.

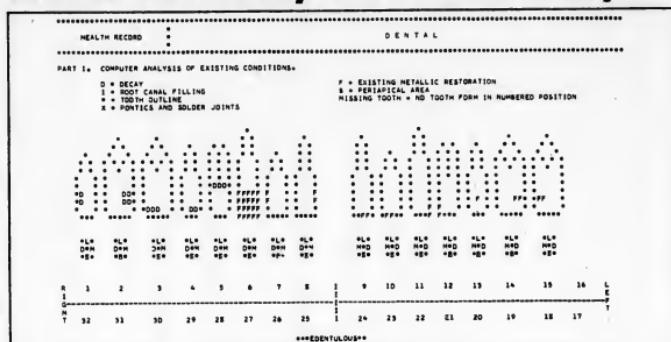
Data Lock Division, Dynamics Inc.
2745 Bernice Rd., Lansing, Ill. 60438
(312) 474-5100

Computer/Scanner Aids Analysis of Dental X-Rays

WASHINGTON, D.C. — A meeting, some 15 months ago between Major Gen. Robert B. Shira, assistant surgeon general and chief of the U.S. Army Dental Corps, and Dr. David Mushabac, research scientist at the New York State University at Stony Brook, has resulted in an improved dental diagnostic and recording system. Specifically, Dr. Andrew J. Sano, has suggested a way of reducing the time it takes to examine and diagnose each recruit and patient.

Col. Donald J. Styer, in Gen. Shira's office, and Dr. Mushabac discussed the possibility of developing a dental x-ray computer/scanner unit that would free Army dentists for more productive duties and patient care; speed the interpretation of x-ray records; and develop a more economical, yet faster method of handling volume dental requirements in reception centers.

Last month, Dr. Mushabac successfully demonstrated to senior dental officers at Walter Reed Army Institute of Research the feasibility of his dental x-ray scanner with immediate computer analysis. The unit demonstrated that the time required for the average patient's diagnostic examination was reduced to about one minute. The time lag between the x-ray of a patient's mouth and the resulting study and diagnosis has also been completely eliminated; and since the



A printout of the computer's analysis of a patient's teeth.

System to Speed Firm's Linen Deliveries

KANSAS CITY, Mo. — Standard Linen, Inc., one of the Kansas City area's largest distributors of linen products to restaurants and industry, will soon be managing its complex daily inventory problems by computer.

One of the major applications for the NCR Century 100, to be

delivered in November, will be the automatic preparation of daily inventory lists for each route man. These detail the volume of used linen to be picked up at each of many locations. The night control system will expect to reduce item losses which in this type of large

volume rental business can run extremely high, a Standard spokesman said.

The computer will also provide reports which will help management plan plant layout and scheduling routes for other operations. The system also will handle invoicing and prepare payroll.

Standard Linen, which has been expanding into the field of distributorship, plans to furnish a wide variety of linen items to hotels and restaurants, as well as work uniforms to hospitals and manufacturing companies.

3-Hour Analysis Would Have Taken Months by Hand

ST. LOUIS, Mo. — Computers have provided solutions to problems confronting Panama Canal Co. engineers involved in analyzing slopes of the canal.

Engineering solutions are one aspect of a broad study in progress at the canal, where engineers are attempting to determine the stability of various slopes.

The Panama Canal was carved mostly through hilly country. In the past, rock slides have occurred along the canal in the area of the Continental Divide, although engineers, through continuing studies and preventive measures, have now all but precluded the possibility of a major

slope interrupting canal traffic. "Computerized analytical methods have a definite and valuable part in assessing the stability of slopes," said Col. James A. Bettis, U.S. Army Corps of Engineers director of engineering and construction for the Panama Canal Co. Such analytical methods, he said, depend on the repetitive solution of a large number of problems which involve the determination of slope conditions and bracket certain values and parameters.

Computers are invaluable to the engineer in solving such large numbers of problems, a spokesman said. Each of the 27 cross sections of the canal analyzed

contained about 1,000 factor-of-safety determinations that were calculated by McDonnell Automation's largest computer

here in three hours of computing time. It is estimated it would have taken an engineer two and a half years.

Drug Wholesalers On Regional Sales

NEW YORK — Pharmaceutical manufacturers will have access to complete information on drug sales by geographical area through a computerized data system initiated by Cambridge Computer Corp.

Cambridge signed a contract with Drug Distribution Data, Inc., a subsidiary of the National Wholesale Druggists Association, to collect and process sales data from wholesale druggists for pharmaceutical manufacturers.

The system utilizes the resources of drug wholesalers to provide detailed information on a monthly basis.

"It assures reliable information invaluable to the manufacturer in formulating marketing and information plans and in es-

sisting him to better direct the marketing efforts of his detail men," said Edwin A. Hammel, Cambridge marketing vice-president.

The initial pilot operation will concentrate on drug sales in California, where more than 50 wholesalers. The wholesalers will make regular reports on product movement which will be processed by Cambridge at its San Mateo, Calif., facility.

An IBM 360 at San Mateo will eventually process more than 1,000,000 invoice lines per month into the system.

According to Hammel, the system will provide the basic information for additional, market analysis reporting vital to pharmaceutical manufacturers.



Pert--Without a Computer

A new Pert-O-Graph magnetic board has been introduced to allow Pert-style management decisions and considerations to be worked out in a conference room. The board and the blank activity blocks are magnetic. Available from Halcomb Associates, Sunnyvale, Calif.

9 Days on the Arctic Ice

Computer Scientist Gets Within 2 Miles of North Pole

By Lewis Cope

MINNEAPOLIS — Robert Lillestrand, a research scientist at Control Data Corp., recently returned from nine busy days floating around on the ice within 20 miles of the North Pole.

Twice he got within two miles of the Pole.

What's a computer scientist doing to the Pole, even if he is a navigation expert?

Lillestrand explained that his navigation measurements will be analyzed by a computer, and he

expects to achieve location accuracy to within 100 feet or less.

The computer "is essential for the very complicated navigation experiments involved," he said. His participation is noted as the exact path of the ice drift in that top-of-the-world region.

Lillestrand said that while he had to bring his data back this time, "small computers do this job have just become available within the past year that in the future can be used on the ice."

He said the holdup this year was that needed software was still being developed.

The small computers will be a big boom to Arctic exploration, he said, adding that there will be "on the site, telling us new questions we need to answer while we are still there."

Lillestrand said the expedition "should greatly increase our knowledge about that exciting region."

Lillestrand helped start the major geophysical, oceanographic, and weather research under-

taking that was sponsored by agencies of the Canadian government.

He and the 15 fellow team members flew into the polar region in two-engine planes and set up a base camp about 20 miles from the Pole.

The group was on the ice from April 8 to the 17. The weather was record cold, 40 degrees below zero during his stay.

It was daylight 24 hours a day in the Pole region, but Lillestrand could still sight stars as well as the sun for navigation sightings.

Lillestrand also made a special set of measurements with the Transit navigation satellite that should tell, with more accuracy

than ever before possible, just how flattened the Earth is in the North Pole region.

It is already known that the distance from the center of the Earth to sea level is 13 miles greater at the equator than at the Pole. After computer analysis of the data, he hopes to pin down this figure to within a matter of yards.

The polar expedition was sponsored by Dominion Observatory and Polar Shelf Project, both Canadian government agencies.

Lillestrand is director of electro-optics research, part of the research division, at Control Data. His current work deals with computerized mapping and pattern recognition.

Minnesota Blue Cross Computer Center Offers 10 DP Applications to Hospitals

ST. PAUL, Minn. — An advanced computer-sharing arrangement is now completed and able to provide 10 advanced computer applications to hospitals throughout Minnesota.

"This is the first time we offer a high degree of computerization to hospitals on a larger scale than any other shared EDP hospital in the world," said Darrel Gubrud, vice-president for EDP of Minnesota Blue Cross.

Blue Cross operates the computer center in a cooperative arrangement with the hospitals. A Honeywell 1200 and a Honeywell 200 are used. These are separate from the computers used by Blue Cross for its own workload.

Ten hospitals in the state, located in three cities, are on-line and represent almost 25% of the state's hospital beds.

About 60 other hospitals throughout the state, many of

them fairly small, send in punched cards for processing.

Computer services now offered under sharing arrangement include: patient accounting, discharged accounts receivable, preventive maintenance, ledger, personnel, inventory, accounts payable, cost allocation, and general ledger responsibility reporting.

Most of the on-line hospitals are expected to use all of these services, while the others, in most cases, will use only a portion of them.

Jack Rival, administrator of the on-line, 130-bed Elsie Hospital in St. Paul, said, "It's probably the only way for a hospital of our size to avail itself of an integrated system. We certainly won't be able to do anything of this scope on our own."

Gubrud said it cost an on-line hospital about 85 to 90 cents a

patient-day to get all 10 computer services. He said his study found that hospitals in the state with their own computers have comparable expenses of \$12.50 to \$15.50 patient-day, "up to \$2.25 a patient-day."

He said participating hospitals will pay \$575,593 this year for the shared-computer arrangement, and Blue Cross will pay \$371,660. It is anticipated that Blue Cross will use the patient-billing information coming directly to it.

The Honeywell Model 1200 is used as a batch processor, has eight magnetic tape drives, a high-speed reader, and a high-speed printer.

The Honeywell Model 200 is used for communications and has two magnetic tape drives, a high-speed printer, and two random-access drums with a total storage capacity of 7.8 million characters.

COLUMBUS, Ohio — Hazards to fish and other aquatic life caused by thermal effluents in streams and lakes can now be better predicted by a mathematical model developed at the Columbus Laboratories of Battelle Memorial Institute.

Given the appropriate input data, the mathematical tool permits ecologists to go beyond predicting how heated effluents upset the life systems found in freshwater lakes and streams, a lab spokesman said. Until now, predictive models concerned with thermal pollution were limited largely to predicting increased temperature at a given time and distance from where the effluent was introduced.

The Battelle model, developed by Drs. Sanford G. Bloom, Arthur A. Levin, and Gilbert B. Ladd, can actually simulate the direct and indirect response of individual aquatic species or groups of species such as herbivores, carnivores, algae, and plant debris to heat influxes. Most commercial and industrial effluents, such as dredge and trout, are considered carnivores. The turtle is an example of an herbivore.

In the direct reactions, the scientists are concerned with the way in which the actual contact with the heat affects aquatic life. For instance, does heat have direct effects on the particular group of herbivores? In the indirect reaction, they want to know how the initial effect carries on through the aquatic life survival cycle. For example, how does the indirect effect of the particular group of plant eaters affect the existence of a flesh-eating group of organisms which preyed on the now-extinct group.

The model permits the simulation of number of such direct and indirect ecological effects that can be triggered through various devices. Direct effects include: direct mortality, decreased or increased reproduction, and increased growth rate. Indirect effects include mortality to predators or prey and changes in migration patterns.

Various factors go in an aquatic environment and which are therefore described by the model include transfer of heat, physical mass, and biomass. Biomass transfer includes the feeding habits and migration patterns of the various aquatic species. Parameters considered are: velocity, dispersion coefficient, and various rate coefficients.

Understanding aquatic ecosystems and their complex responses to thermal effluents will become more important as the need for electrical power increases, the model designer said. This is due to the fact that large quantities of water are required in the cooling stage of power generating facilities.

Subscribe to Computerworld



with a GATES ACOUSTINET

Place your teletype where you want it — no longer hidden away in a separate room. This attractively designed Series 800 Gates Acoustinet will reduce the noise level of your teletype while maintaining the clarity of the original signal. The result: quiet yet clear communication with office managers with the increased efficiency of your teletype.

You too can smile with this new-found quiet for your teletype or any other office machine — simply write to...

GATES ACOUSTINET, INC.

Box 1400-3C — Santa Rosa, Calif. 95403 • (707) 544-2711

Iowa Legislators On-Line To a Remote Data Bank

DES MOINES, Iowa — Iowa's state senators and representatives are using computer-linked visual display terminals for instant research on legislative proceedings.

The display units, stationed near the House and Senate chambers and in other key government offices, are connected by telephone lines to an IBM 360/40 which stores the legislative data.

Serge Garrison, director of

legislative research, said volume on the information network is expected to reach 1,000 inquiries a day.

Garrison said a total of 33 of the 2260 terminals are currently installed. In addition to the four terminals serving the legislature, units are located in the offices of the governor, the State Insurance Commission and the comptroller, as well as in the departments of revenue and finance.

Computer Controlled Sex Spreads To Nationwide Breeding of Cattle

NEW YORK — Computer controlled sex is spreading. A nationwide network of cattle breeding farms is now using an on-line system to schedule breeding periods of cows and bulls.

Programming Methods, Inc. developed the system for Black Watch Farms. The system automatically prepares morning reports for each ranch location detailing the tasks for that day. The status of each cow is reviewed by the computer each

day, and impregnation schedules, follow-up procedures, and other tasks are created for the ranch hands.

As results, statistical and status reports are created and investors are notified of the current status of their herd.

The system is being implemented on a combination of IBM 360 and SDS real-time computers, the model designer said.

On-line Teletype terminals are employed for the data gathering and disseminating function.

Computer 'Doing Fine' After Third Crossing

NEW YORK — The Queen Elizabeth returned to New York after her third Atlantic crossing, and her crew reported that her Ferranti Argus 400 computer was "doing fine." The report was of more than passing interest, because the computer was designed to play a major role in the operation of the ship and indirectly in maintaining the pride of British shipping in general.

The old Queen Elizabeth and her sister ship, the Queen Mary, had beaten after 30 years, not because they were unsatisfactory, but simply because they were unable to compete economically with the speed of jet planes. They provided superb service, but provided it expensively. They were unable to take advantage of the computers to make savings because there was no effective system for informing the people responsible in time for them to act.

Dual Role

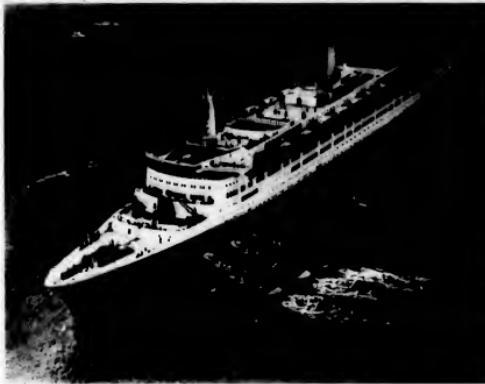
The role of the Ferranti Argus lies in providing just such an opportunity. Cunard Lines says it is the most sophisticated computer ever installed in a merchant ship and specifically, that it is the first to combine technical and commercial operations at sea.

On the technical side, it can select the proper course for the ship to bring her into port on time, and with fuel economy. It takes into account the water flow of the various Atlantic currents, the weather reports from the Earth satellites, and other details. In selecting the courses, however, it does not usurp the captain's position. When necessary, it will provide three choices and let him select the one he wants.

In facing a storm, for instance, the computer will find one route around it, another straight through it, and then based on the least expensive route. At the same time, thinking of passenger comfort, it will tell the captain just how bad the waves are likely to be and how much disturbance there will be. Passengers will experience it if he chooses the course through the storm.

The passengers' comfort is also considered in simple matters as hot water, for instance. The Ferranti system looks after the amount of heat required on the time of day and on how much hot water is actually being used. As a result, it is hoped that there will still be hot water even when everyone simultaneously decides to take a shower.

This possibility is not an entire-



The Queen Elizabeth II gets help from some tugs as she docks in New York. (Wide World Photo)

ly unknown occurrence. Times shortly after departure and immediately before arrival have been found to create this type of hosing problem.

The cost of the computer system is above and the conventional data logging has been estimated at \$135,000. Cunard expects to recover it in two or three years.

Computerized Blood Test Developed by Engineers

CAMBRIDGE, Mass. — Electrical engineers at MIT have demonstrated the feasibility of a computerized technique for administering a common type of blood test.

Specifically, the automated technique can identify the five principal types of white blood cells, their varying dimensions in color, shape, and texture. Identification of the white cells, and the noting of variations from the norm in quantity, new would be used diagnostic test for infections, allergies, leukemia, typhoid fever, and certain types of poisoning.

90-95% Success

The computerized technique was developed by Prof. Murray Eden and Dr. John Young, and Ian T. Young, both of MIT's Research Laboratory of Electronics. The researchers have reported that the technique is 95% successful in locating white blood cells in a vast field of red cells and platelets, and 90% accurate in sorting the cells into the five types.

The development was reported for the first time last month at the annual review of RLE re-

search for the Joint Services Technical Advisory Committee (which together with the National Institutes of Health, sponsored the Eden-Young research).

Manual counting of white blood cells consume thousands of man hours and an estimated \$20 million annually. A computerized replacement, which Young hopes might eventually be connected directly to the microscope — would be faster, more accurate, and less expensive.

Color Optical Scanner

Important in the development of the technique was a color electro-optical scanner (one of the few in existence) developed by Oleg Tretiak, an MIT lecturer in physics. The scanner's color scanner converts data on color slides into digitized electronic signals which may be stored on magnetic tape.

An interesting sidelight of the technique is that essentially the same errors made by humans in the manual operation are made by the computer. Consequently, Eden and Young have roughly duplicated by computer a certain type of human behavior.

Airborne EDP Command System Tested

HANSCOM FIELD, Mass. — A Strategic Air Command airborne command post outfitted with a new EDP system is undergoing preliminary operational tests by the Electronic Systems Division of the Air Force Systems Command. The system is designed to help SAC commanders direct their retaliatory forces.

The division is flying the aircraft from Hanscom Field as the first step in a program designed to explore the application of EDP equipment for airborne "command control" purposes.

The test plane is a four-jet, EC-135 "Looking Glass" aircraft that is part of the SAC command fleet.

Major Albert Pital, director of the flight test program for the Electronic Systems Division, said, "When the plane finishes its program here this week, it will go back to SAC and take its position in the regular Looking Glass fleet. The flight tests will help compare the performance of the automated system with SAC's current system."

Under this EDP program, off-the-shelf equipment was installed in the "Looking Glass" aircraft at the RCA Aerospace Systems Division, Burlington, Mass. The program is formally known as the Post Attack Command Control System-Airborne (PACC-ADA).

Major parts of the PACC-ADA equipment include RCA's Variable Instruction Computer (VIC), a compact, high-speed, high-capacity, general-purpose computer; the largest rotating drum memory (100 million bits)

used in airborne applications; five RCA video data display units; and data tapes and print units.

"This is a challenging program," he said, "because this is a one-of-a-kind system. There isn't anything to fall back on for background or assistance. It's been a learning process for all of us, and we'll learn a lot about how military decision makers operate in an automated airborne environment during the test program."

Equipment in the PACC-ADA aircraft was first tested in RCA's Burlington facility before being installed in the EC-135 at nearby Hanscom Field. Although the

equipment was not specifically developed for the program, some modifications were made to adapt it to the aircraft.

One of the prime goals of the test program is to explore the "man-machine interface" problems that might occur, the major continued.

"Here we have all the equipment. The operators must perform their functions and get information for decision-making from the equipment. We will learn whether the data the operators obtain is usable and proper and whether it interfaces nicely with man's ability to do this job," Major Pital stated.

Farmers Use Time-Sharing System To Watch Their Profit Margins

QUINCY, Wash. — Farming in Washington State is going time-sharing and is getting its start with a computerized program. Dwarf Orchard Development Co. is emphasizing cost accounting rather than the routine operations done on general computers. The firm expects for this function a time-shared operation has many advantages.

Willard F. Hens, general manager, told CW that the farming area was not currently being farmed because it was too far from few people who understood both agriculture and data processing. But they hope to crack this nut, he said.

Lean Margins Involved

The company uses Tymshare

systems and has found that margins are lean in farming. The program provides for a farmer with a computer-generated reports of labor costs which are directed both to the farmer and to his lending institution to create a firm basis for financial decisions.

In the future, the firm expects to offer a system of management instruments such as a spray-analysis program to choose the least expensive plant-disease control chemical.

Tymshare Pleased

Tymshare officials say they are quite pleased with the operation because, as they point out, when a farmer becomes a user of the farm management program he also becomes a user of Tymshare equipment.

NOTICE TO NEW YORK AREA ADVERTISERS

In order to better serve our New York, New Jersey, and Pennsylvania clients, COMPUTERWORLD is pleased to announce the appointment of:

Mr. Donald E. Fagan
Sales Manager
New York Region,
Computerworld
Suite 3G
120 East 34th Street
New York, N.Y. 10016
(212) 532-1790

We're delighted to have Don head up our new full-time Advertising Sales office... and we feel that you will greatly benefit from this permanent addition to our staff.

Firm Will Offer Microfilmer Tape-to-Print Service

ROCHESTER, N.Y.—Xerographic Copy Service, Inc. will become one of the first business services companies to offer a microfilmer that will print data from computer tape 20-to-40 times faster than conventional methods, according to the company.

Walter C. Wygant, president of Xerographic Copy Service, said, "The purchase of the KOM-90 means many firms will be able to take advantage of the most advanced computer printout technology without a heavy cash outlay."

The KOM-90 microfilmer decodes data from computer magnetic tape and photographs the images directly onto 16mm motion film at the rate of 90,000 char/sec.

The computer output film has many advantages, such as processing speed, elimination of much paper space, variety of formats, lower material costs, and quick retrieval.

Xerographic Copy Service customers will also have the option of quantity paper copies made from microfilm, magnetic tape copies of disk, magnetic microstrips, Dekastrips, and other types of microfilm.

Conventional printout procedures, while being slower, can print out any type of paper which must be stored.

Wygant noted that retrieval time will be faster with Xerographic Copy Services' KOM-90. "Less than 10% of computer printouts is all that is needed for information requests again," he said. "It's obviously a monumental task to get at the information quickly. KOM-90 assures convenient storage and instant retrieval."

Wygant said that his firm is

now inspecting locations in Rochester, Buffalo, and Pittsburgh for installation of the unit to be installed later this year.

The firm also is expanding the number of Co-op Copy Stations it operates throughout the country and is broadening its product line of office supplies.

Computerized Management System Ready for Printers

PRINCETON, N.J. — The development of the PMIS (printing management information system) offers the advantages of computerized business systems without the costs and problems associated with buying a computer, is now in operation.

According to the company, PMIS gives the printer detailed, accurate, and timely reports on job costing, work in process, production analysis (by operation, by department, by process), profit analysis, and sales analysis. The PMIS service is available to printers in the New York metropolitan area either from the New York office of Printing Industry Computer Associates at Two Penn Plaza or from the Princeton, N.J., office at 228 Alexander.

U. S. Systems Offers EDP System for Laboratories

LOS ANGELES — U. S. Systems & Services, Inc. has developed and is offering to clinical laboratories a computerized system which records and stores data from instrumented test devices, measures, accepts and recorded tests on any given patient available to physicians, and, in addition, processes accounting and billing for laboratory charges.

The computer printout supplies the physician on which each test was run, together with the doctor's and patient's names.

U. S. Systems installs at the laboratory site a DEC PDP-12 computer as part of the package. Charges for the service are based upon volume.

Harry Marsh, a biochemist, formerly with Technicon Corp., and at one time head of a major clinical laboratory in Southern California, has been named head

of U. S. Systems' medical data services division, which handles the computerized clinical laboratory service.

Greyhound Computer Corp. To Open Cleveland Center

CLEVELAND — Greyhound Computer Corp. has announced plans to open a major data service center in its third nationally, in Cleveland.

Ryel R. Popps, vice-president for data services as well as president of Greyhound Time-sharing Computer Corp., hopes the Cleveland center will be operational by mid-July.

It will employ 50 persons within 18 months," he said. Major data service centers were opened in 1968 at the Chicago

headquarters of the Greyhound Corp. subsidiary, and at San Francisco. Their revenues projected for 1969 are nearly \$4 million.

Popps said the Cleveland data service center will offer "time sales, project management, time-sharing, and service bureau applications."

Services

He said the Cleveland center, to be located at an unannounced location now undergoing inspection — "less than two miles from Public Square and a few blocks from major exits and entrances to the Main Bell Expressway" — will operate on a 24-hour, seven-day-a-week basis.

The data facilities division offers prime time from 9 a.m. to 5 p.m. second and third shifts, and a special weekend accommodation.

The configuration includes an IBM 360/40 with 128K memory, a 2340, 2401s (Model 5, 9-track) and Model 2, 7-track drive), three 3311s, and a 1403

IBM's Midtown Manhattan Service Area Utilizes Latest Automated Dispatching

NEW YORK — When customers call the field engineering office in midtown Manhattan, they may require information, minor adjustments to their data processing equipment, emergency service, or parts replacement. No matter which of these

Customer requires, the field engineering division, which installs and services IBM's data processing systems and equipment, wants its customer engineers to handle calls quickly.

To accelerate response, IBM's midtown offices at Madison Ave.

and 42nd Street employ a unique method for reaching and dispatching their customer engineers, scattered throughout the city working at customer locations.

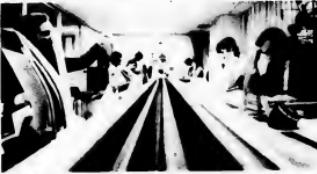
With a new conveyor-radio patch system, a request for service can be relayed to the customer engineer regardless of his location, within minutes after the customer calls the IBM office.

A dispatcher enters the information on a card on which he then places on a multiline conveyor belt resembling a moving model of an expressway.

The card moves quickly to a radio room where another dispatcher transmits verbal instructions to an IBM customer engineer carrying a compact radio receiver on his belt.

The radio voice transmission from the radio dispatcher relays the necessary information to the customer engineer enabling him to telephone or go directly to the customer requesting help. Radio dispatching not only speeds up service, but also saves time by eliminating the interruptions of being called to the phone at a customer location.

Another advantage of radio dispatch is the capability of intercepting a customer engineer en route. With radio dispatch, he can be reached in an elevator, in a cab, or on the street. No time is lost on unnecessary calls.



Incoming dispatch card is delivered to radio dispatcher who signals a customer engineer.



Customer service calls on cards are carried to the radio room (rear) on an eight-lane "expressway conveyor."



When customer service requests come into the IBM midtown Manhattan offices, dispatchers enter requests on cards which are then placed on a conveyor system.



The dispatcher relays all necessary information to the engineer anywhere in Manhattan.

Consulting - Leasing - Software



EDPRORESOURCES INC.
White Plains Plaza
One North Broadway
White Plains, N.Y. 10601
914-428-3804

** 1401 CO3, 1402, 1403
** 1401 CO4, 1402, 1403, 1406
** 1440 12K Disk System
** 2074 10K, 800 bpi
** 360/30, 16K, 2 us.

GEORGE S. MC LAUGHLIN ASSOCIATES, INC.
785 Springfield Avenue
Summit, New Jersey 07901
(201) 273-5464

FOR SALE \$30,000
\$47,500

gsm
• Computer Leaser
• Computer Dealer
• Computer Broker

WANTED
Brokerage
Margin
Program

Medium size Brokerage House seeks operating, fully documented Margin Program for utilization on 360/30, 5 tape, 3 disk system.

Should have capability to accept our properly converted input data. Please contact:
Mr. F. Kiefer 212-984-4646

ABM Beyond State of Software the Art, Expert Says

Continued from Page 1

report. "The computers involved in ABM systems would be the largest and most complex ever built. The proposed system would include 20 data processing units and have a capacity equivalent to 100 large commercial computers." The hardware would be "more sophisticated and complex than any accomplished so far," and present problems "not yet solved even on a theoretical level," particularly in the area of proving that a program fulfills its assigned task.

The computers would:

- Intercept radar signals.
- Identify potential targets.
- Track incoming objects.
- Predict trajectories.
- Distinguish between warheads and decoys.
- Reject signals from earlier nuclear explosions.
- Compute for blackout effects.
- Allocate launch, and guide interceptor missiles.
- Arm missiles if they get within range of a target.

All of the would be done within 10 minutes between the time attacking missiles are sighted and the time when they must be intercepted. In addition, 10 to 15% of the computer time would be for self-checking.

Advances Often Required

Substantial advances are frequently required, says the report, because designers of new weapons systems use "more sophisticated forms of technology— even when that technology is only at the earliest stages of development." The report notes that this is particularly true of the Safeguard computer elements.

But the report also notes, "The result of this attempt to stay on the frontier of technology is that weapons systems consistently fail to live up to expectations and their performance is especially inadequate." The report cites a Budget Bureau study of weapons systems that required a major advance in either radar or computers. Of 11 such systems proposed between 1964 and 1967, only two met performance specifications, one reached 75%, two reached 50%, and six reached only to 25%.

The report continues that "unreliability of anything approaching the magnitude suggested by the experience reviewed above would be wholly unacceptable," but notes grimly that "there is little reason to believe that the Safeguard will better the average of these other systems, and some grounds for thinking it may do even worse."

Special Section on Computers

The special section of the report devoted to computers was written by Licklider, head of MIT's Project Mac, which developed one of the most advanced timesharing systems.

Licklider points out that the problems of weapons systems are not unique, and that other time are "grossly underestimated." He cites a study that shows that weapons systems typically cost 200 to 300% more than the Pentagon estimates and generally are turned out two years later than promised.

One of the reasons for delay, complex systems, including airline reservation systems and a new electronic switching system, have similar problems.

Bugs Inevitable

Applying past experience on advanced systems to the ABM, Licklider states that "no matter how simple and straightforward it is expected to be, the ABM software will turn out to be very complex, continually in the process of revision, and never free of bugs."

The bugs are the result of the complexity and are inevitable; they are "not evidence of poor workmanship or the part of the programmer." Licklider declares flatly: "All large computer systems that exist contain bugs. There is no prospect of wholly perfect software in any large software system in the near decade."

Succs (Strategic Air Command Control System) "showed dramatically that, when software gets very complex, when software gets more and more complex and more and more bugs, the program gets more and more complicated but not more and more operable. You begin to understand the possibility that they may literally never be debugged."

Licklider warns: "To put Succs-like software into an ABM system would be folly—especially if it is to be a well-perfected software into an ABM system would be— and this is the consensus of experienced systems programmers—impossible."



100% = promised performance. Standard Systems are estimated and exact identification is not available.

Testing Required, But Impossible

Because of the bugs, successful systems such as those used in the Apollo moon flights involve extensive testing and revision. But little reason to believe that the Safeguard will better the average of these other systems, and some grounds for thinking it may do even worse."

The report continues that "unreliability of anything approaching the magnitude suggested by the experience reviewed above would be wholly unacceptable," but notes grimly that "there is little reason to believe that the Safeguard will better the average of these other systems, and some grounds for thinking it may do even worse."

Special Section on Computers

The special section of the report devoted to computers was written by Licklider, head of MIT's Project Mac, which developed one of the most advanced timesharing systems.

Licklider points out that the problems of weapons systems are not unique, and that other time are "grossly underestimated." He cites a study that shows that weapons systems typically cost 200 to 300% more than the Pentagon estimates and generally are turned out two years later than promised.



J.C.R. Licklider



Jerome Wiesner

of programming required was underestimated by 6,000 at a time when there were only 1,000 programmers in the world.

Eight Years to Program?

Large programming tasks which involve many programmers and many instructions per second—say 160 instructions per second per man, he reports and further suggests that as the group becomes larger, productivity

decreases. He concludes that it may not be possible to produce more than 10,000 to 20,000 instructions per month on a project such as this no matter how many programmers are hired. At this rate, the software for a 10-second duration ABM subsystem would take four to eight years to produce.

The report is now available in bookstores. Hardback edition (Harper and Row) costs \$5.95, work."

while the paperback (New American Library) costs 95 cents.

The introduction to the report is written by Kennedy. He declares in it that the ABM is "the single most complex undertaking man has yet set for himself in his time on earth, but if experience with previous national defense programs teaches any lesson, it will be years late in completion and may never

General Electric Plans Major Expansion Of Various Service Bureau Activities

BETHESDA, Md.—Concurrent with the development of its communications network (see page 1), GE is expanding its operations in marketing of conversational time-sharing and is introducing new on-line and customer support services.

Describing some of these plans, Paul W. Sage cited the following:

An additional \$20 million is now being invested to expand the availability of time-sharing services in the U.S. This is expected to bring the \$34 million U.S. investment announced last week, means that by year-end more than 75 systems will be installed nationwide for subscribers in 17 countries on five continents.

Additional GE-600 series systems will be installed to double the capacity for Mark II service in the U.S. These systems will be installed in centers such as a new Teaneck, N.J., facility scheduled for dedication in late June, GE said.

A new on-line batch-processing service called 3D Resource is now being marketed in the Washington and Philadelphia areas. The service will be available on a national basis by year-end.

Customer support will be expanded by offering additional GE application programs and a new 3D Resource system which makes available program developed by industry experts.

Noting that "many companies have mastered computing," Sage said the network goes beyond

this stage by integrating communications systems and computers into a total service offering.

"GE is committing substantial technical, financial, and managerial resources to a business which by 1975 will be consumer-oriented and oriented to commercial applications and automobiles."

"Our emphasis is on understanding the customer and providing a complete on-line service which meets its total needs at work, in school, and before long, in his home."

Discussing the national computer network, Sage said it will have a major impact on the growth of subscription on-line services and computer programs.

Initial use is expected to be by firms doing business in many locations throughout the country.

From terminals in their offices, people in each location who have programs never before used in their work will be able to dial a local telephone number to access the same computer system's centrally stored information and proprietary application programs.

Data which at each office's rates for a given time period can be transmitted to, and stored on, the same remote computer.

The firm's headquarters staff can immediately use the information to prepare reports, sales forecasts, and analyses of current operations.

Looking to the future, Sage said GE is developing a successful business of "bringing com-

puters to people" by expanding its base of time-sharing service new on-line capabilities and customer support services.

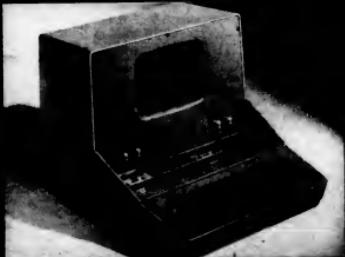
Complementary time-sharing: Two complementary services, Mark I on GE-200 series systems, and Mark II on GE-600 systems are now being marketed. The former will be expanded internationally during 1969-1970. The present Los Angeles center will be expanded and new centers in Chicago and the New York area will be added. The new Teaneck facility will provide additional capacity to East Coast subscribers.

On-line batch processing: A new 3D Resource service is now being marketed in the Washington and Philadelphia metropolitan areas. The service, based on a GE-600 series system with Geos III operating software, enables subscribers to solve their entire data processing problems on a single system and to use a computer system's processing power to process data available from either a small computer such as a GE-115 or teletypewriter at a customer's location. Local batch processing can be executed at GE-600 sites. Complementary time-sharing is provided through teletypewriter terminals. All three modes can be accomplished concurrently.

Application services: This service minimizes the need for customers to develop their own computer programs

\$1.30 a day

[Except February, \$1.39 a day.]



But to make it a little easier for all of us, we'll bill you at the rate of \$39 a month. That's all it costs to rent a System 21 computer station with a micro-processor, two data recorders, typewriter/key punch keyboard and a video display.

Communications, hard copy and color display capabilities are optional.

Everything you need for a complete data input and communication network. Links your computer with every desk where data is gathered or processed.

The VIATRON rental agreement contains a 30-day cancellation clause and provides you, at no charge, with two standby units with every fifty you rent. If you have any problems, all you do is unplug the unit and plug in a new one. (If you rent fewer than 50 units, backups are available at 75 per cent of monthly rentals. Or, we will ship a replacement within four hours of notification.)

If you'd like a copy of this rental agreement and a complete rundown of System 21 capabilities write VIATRON Computer Systems Corporation, Dept. C-12, Route 62, Bedford, Massachusetts 01730. Or, telephone (617) 275-6100. We'll show you how to pinch pennies.



VIATRON System 21 puts the logic where the problem is

FOR SALE!
64 IBM 026's
UNDER MAINTENANCE
AVAILABLE IMMEDIATELY!!!

... Call me collect.
 Ed Cherney (313) 964-6800

MARBEAU DATA
 CORPORATION PROCESSING SYSTEMS & EQUIPMENT

839 PENOBSCT BLDG. DETROIT, MICH. 48226



Perfect mate for the 1108.

No doubt you've read ads about small time-sharing systems that claim to do everything.

Ours doesn't.

We've designed our MINITS II for one purpose only: to give you your UNIVAC 1108 a time-sharing capability. It can cut computation costs and greatly increase the flexibility of the 1108 by adding a new and more economical method of processing engineering and scientific applications. With only one MINITS II time-sharing system, you allow 24 people to simultaneously access your 1108 while you continue to run batch work. Its speed is an impressive four seconds maximum response time.

Speed and flexibility are only part of the story: MINITS II provides a time-share capability for approximately the price of one

high-speed line printer. The ability to develop and partially debug programs on MINITS II before running them on the 1108 further enhances its time/cost-saving features.

The MINITS II command language is complete, simple, and one of the easiest to use terminal languages available. It's designed to ease your burdens by minimizing the learning curve. MINITS II is fluent in a wide variety of fully conversational languages. Included are FORTRAN, BASIC, Desklculator, and EDITOR. An 1108 symbiotic is provided for direct communication with the 1108 and its mass storage devices.

Take two minutes to learn more about MINITS II, the perfect mate for the 1108.

It can significantly cut computa-

tion costs by increasing the performance of your current computer system.

If you're not using the 1108... Our MINITS II time-sharing system is similar to MINITS II, with the exception of the 1108 coupler and associated 1108 software. It is used as a complete, stand-alone time-sharing system capable of serving 24 users simultaneously. Its advanced features make it ideal for companies who desire the security and economy of their own in-house time sharing computer, or for individuals who wish to enter the time-sharing business on a modest scale.

JACOBI SYSTEMS CORPORATION

16641 Ventura Blvd., Encino, Calif. 91316
 Telephone (213) 981-3010

Credit Authorizations Are Given In About 30 Seconds, Bank Says

BUFFALO, N.Y. — Marine Midland Banks, Inc. is employing a computer to eliminate delays in obtaining credit authorization for Marine Midland Master Charge card holders in western New York. The system is being expanded to all of New York state during 1969.

Before the RCA Spectra 70/45 computer was installed, the time required to obtain authorization was often several minutes, a bank spokesman said. Now the computer answers more than 1,000 inquiries instantaneously every day at an average time of about 30 seconds each, he said.

The computer also has been

programmed to refer nonroutine credit decisions to experienced credit-authorization supervisors. This can occur, for example, if the desired purchase is larger than the customer's available credit balance, or if the customer has reported his credit card stolen.

The computer will automatically display the card holder's status report on a video data terminal for the supervisor. She evaluates the credit history and, if the facts warrant it, authorizes the purchase.

By utilizing this "human override" feature, Marine Midland can provide efficient automated

service and guarantee that no customer will be handled dis-
courteously without appeal to human understanding and judgment.

When a card holder wants to make a purchase at a member establishment, he gives his card to the merchant, who telephones the Marine Midland credit authorization department. The merchant relates the card holder's name and credit card number to a clerk who types this information on an RCA video data terminal. The terminal transmits the information to the computer, which checks the file to determine the card holder's name and address. On the average, on 30 seconds elapse from the time the merchant contacts the clerk until he receives his answer, the spokesman said.

More than 90% of the inquiries to the computer are referred with an approval and a credit authorization number, he said. This tells the merchant that the card holder is authorized to make a credit purchase of the requested amount.

In some cases, a restraint code is displayed, indicating, for example, that the card is stolen. With this information, the merchant can prevent the purchase and take the proper action to recover the card.

Credit Reporting

The system has another feature — one that is important to the Marine Midland Banks, as well as to their customers. It is the ability to check a cardholder's credit record, including his name and address. This not only allows Marine Midland to service a customer without actually having his credit card number, but it also facilitates the development of a centralized and automated file for each customer. This file is the first step in building an automated central information file consolidating all Marine Midland's bank records. Currently Marine Midland can retrieve information on customer records only by account number. When customers have savings accounts, demand deposit accounts, loans, charge cards, and other accounts, a clerk has to check each file separately. It is also necessary to know each account number.

When completed, the central information file will permit key bank personnel to obtain instant information on any of the Marine Midland's 1.5 million customers. They will transmit the name and address to the computer and it will supply a full description of the bank's relationship with that customer. This new system of information will provide faster and more efficient service for customers.

Marine Midland Services Corp. is operating the credit authorization system on one Spectra 70/45. Eight other RCA Spectra 70/45's will be added to a statewide computerized information processing network. The network will link the central information file with Marine Midland's 11 full-service banks and 231 offices throughout New York state.



**Buying a big computer
takes more than brains.
More than intuition.
It takes courage.**

Chicago's Water Supply Monitored by Computer

CHICAGO — A computer at Chicago's Central Water Filter Plant constantly monitors surveillance of the nearly one billion gallons of water which daily flow through the plant's 51 acres of purification equipment.

Remote sensing devices at more than 300 points in the IBM 1800 on the quality and quantity of the Lake Michigan water being processed for almost three million residents of Chicago and some 40 suburbs.

Water quality readings at the huge water treatment facility depend on the electronic sensing network for up-to-the-minute reports on quality levels in the incoming water.

Other reports printed on terminals include data on filter performance, amount and concentration of chemicals being used for purification, reservoir levels, and weather conditions. The sensors continually measure these factors to maintain the highest quality water possible. The computer also compares readings of key instruments with preset standards. Any deviation from standard readings triggers an off-normal

report to supervisors who decide on corrective action.

Since the computer constantly watches the entire operation, the men can devote their time to correcting abnormal situations and to experimentation with new purification procedures.

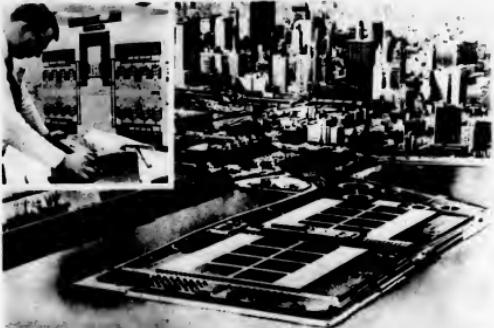
Provides Storm Warning

One such abnormal situation, a plant spokesman said, would occur if an instrument suddenly showed a sharp decrease in the quality level of incoming water. This condition, which could be caused by a storm stirring up the lake, would immediately be checked by the computer for attention for corrective action. The 1800 checks the instruments for variation from normal every two minutes.

To gather all other operating data, the computer polls each of the sensors every two minutes. The electronic messages are converted into digital form and printed in report form hourly on the control room terminal. At midnight, a 24-hour summary is printed.

Supervisors can make inquiries via an IBM 1092 keyboard.

COMPUTERWORLD



An engineer at Chicago's Central Filtration Plant checks printout on the quality level in the water of Lake Michigan.

System Rides Herd at Cattle Auctions

SEALY, Texas — Keeping track of huge numbers of cattle buyers, sellers, bids, and several thousand head of cattle during an auction can be a pretty involved task.

To help keep tabs on which animal goes where, who bought what and who owes how much, the Port City Stockyards is now using an IBM computer to handle the complicated accounting associated with a large auction.

The Port City Stockyards disposed of an average of 5,000 head of livestock during each three-day auction week.

Each animal to be auctioned is tagged on arrival at the Port City Stockyard and its number is fed into an IBM 1800 computer system. Information is sent from the auction yards to the computer area by pneumatic tube.

When the animal is sold, the computer compiles a record of its weight, the selling price, additional handling charges, and the names of the seller and buyer.

After a rancher's cattle have been sold, a printer attached to the computer prepares his payment check and a transaction slip.

Correspondingly, when a buyer has finished his bidding, the computer prepares a list of his transactions, with details on each head he bought, its price, and the pen location of each animal. The printer also invoice showing how much he owes.

At the end of each auction day, the computer compiles and prints a detailed statistical breakdown of the day's transactions.

"Prior to using the system, it was necessary to do a lot of work before we could close and balance the day's transactions," said J.D. Sartwell Sr., president of Port City Stockyard. "Now we will be able to do this within minutes."

Post Office OCR System To Read 60 Type Faces

COLUMBUS, Ohio — Fast, accurate, and efficient sorting of U.S. mail is the goal of a program on advanced character recognition techniques for use in address reading machines. The one-year, \$90,000 study, funded by the Post Office Department, is under way at the Columbus laboratory of Battelle Memorial Institute.

A system capable of accepting more than 90% of the mail passing the electronic scanner is the goal of a research team headed by Battelle's Dr. J. Douglas Hill. The group is aiming for a correct reading level of at least 99%.

"Reading machines now in operation, which will read up to about 36,000 pieces per hour, have comparable accuracy but are considerably less mail," Dr. Hill notes.

Two electro-optical recognition techniques are being considered for translating the printed characters into electronic signals that command large electro-mechanical sorting machines. One of the techniques involves

electronically producing the mathematical equation of the characters that describe the characters.

The second technique under consideration is based on statistical methods of extracting distinguishing features of characters.

Although the automatic sorting machine far outstrips man in the amount of sorted problems, problems do arise to hamper the machine's efficiency when it scans addresses imperfectly printed or located. Such problems include the "widow" envelope with no outer address, smudged or unclear addresses, and characters out of line.

In addition to reading the basic letters and numerals, the recognition system is being designed to read the 60 standard type faces. This will include the type faces commonly used on label printing machines, billing machines, and typewriters. The researchers are working with a Post Office Department data base of 100,000 characters comprising more than 60 type faces.

BOOTH

offers you
significant
savings on
IBM 360
rentals

Booth now offers significant savings on the lease of IBM System/360 computers — with complete physical installation planning and field engineering maintenance and support.

will help you
buy, sell or
lease a used
computer

Booth's Computer Brokerage Division offers the most complete selection of equipment available and equipment wanted — can help you buy, sell or lease any used make or model of 2nd or 3rd generation system or component.

Booth Computer Corporation/U.S. and Overseas Offices

One Maritime Plaza
San Francisco, CA 94111
(415) 899-6560

865 Busey Highway
Park Ridge, IL 60068
(312) 625-7793

1238 Bank of Southwest Bldg
Houston, Texas 77002
(713) 222-7252

Other offices in: London • Zurich • Frankfurt • Rome

410 Park Avenue
New York, New York 10022
(212) 758-9555

6151 West Century Boulevard
Los Angeles, CA 90045
(213) 778-5633

Toronto Dominion Bank Tower
Toronto, Canada
(416) 366-2783



'Service Stores Medical Records For Fast Retrieval Day or Night'

WAYNE, N.J. — The immediate availability of individual medical profiles is offered by the World Medical Data Bank as an addition to personal security plans provided by companies, unions and trade, professional, and other organizations.

Medicom World Medical Data Bank, a division of Command Control, Inc., will record and store the individual medical histories for a lifetime registration fee of \$13. This is a one-time maintenance fee of \$1 per name, but updating the medical data, no matter how often it may be required, is free. Family lifetime registrations are \$21, with a \$2 annual maintenance fee.

The personal insurance service has its basis in a specially designed computerized system for re-

cording and storing up to 102 facts, including blood type, allergies, special conditions and prescriptions, sensitivities, chronic illnesses, and electrocardiograms. Access for the physician is by phone at any time, from anywhere in the world.

The plan is equally applicable, says Martin L. Ludwig, president of Command Control, to in-plant employees who are now also traveling more than ever before. It is to management and sales personnel constantly on the road for business purposes.

Members, who are issued a wallet-size identification card containing their name and mem-

bership number and the telephone number of the direct line to the Medical Data Bank, are also automatically eligible to receive warnings of possible health problems if their medical profile indicates they are in or approaching a group that has a high percentage of medical problems.

The Medical Early Warning System (Mews) is triggered by statistical facts from such sources as the U.S. Department of Health and Human Services medical research groups, and the research done at the World Medical Data Bank, developed as part of a continuing research project on more than 126,000 people.

EDP Helps Jobs Find Candidates

NEW YORK — A computerized employment system has been set up to search out candidates in America for the expanding number of professional jobs in Israel.

The Committee on Manpower Opportunities will utilize the system to "retrieve" American and Canadian professionals for jobs in Israel. The Government of Israel, Israeli Professionals will use it to keep track of the educational and professional experience of Israeli nationals studying or working here, for the ultimate purpose of placing them in the rapidly multiplying number of openings existing for advanced education and specialized professional skills.

The system, put into operation last month, was designed by Employment Systems, Inc. here. The key feature of the system is a portable audio computer terminal coded for 2,000 different skills and interests, and linked to a central IBM 360/40 computer in Detroit which houses the data base.

TWX NEWS TO COMPUTERWORLD



FAST
TWX 710-335-6635

computer time

In Chicago - Call:
(312) 641-1970
75 East Wacker Drive 60601

tb1
TIME BROKERS, INC.
National Brokers of Computer Time
380 Lexington Avenue
N.Y. 10017

\$5 MILLION AVAILABLE NOW TO BUY 3RD GENERATION COMPUTERS.

Write, wire, call



THE COMPUTER EXCHANGE INC.
30 East 42nd Street, New York, N.Y. 10017
(212) 681-5870



Don't even consider buying another flowcharter — from anybody — until you've seen CTC's AUTODOC.

Because AUTODOC is much more than just another flowcharter. It's an automated system that produces complete documentation direct from source program decks.

AUTODOC is not "cheap," but it costs less and does far more than competitive systems.

So don't settle for a "cheap" flowcharter, or even an expensive one. Call the man at CTC Proprietary Systems Division and ask about AUTODOC. You'll like what he whispers in your ear.

Proprietary Systems Division

a division of Computer Time-Sharing Corporation

1018 Palo Alto Office Center
Palo Alto, California 94301
(415) 328-5630

Write for free brochure



- Why aren't you using Marquardt's APL computer time-sharing?
- You'll save time, money and headaches!
- Call "APL Information"
- Los Angeles—(213) 781-2121
- San Francisco—(415) 941-4039
- San Diego—(714) 291-6344

KEYPUNCHING

The Systematics Way

\$3
per hour

Let us give you specifications and we will give you a fixed rate per 1000 cards. Our average criterion is 55 per hour.

Over 200 keypunch operators. Accuracy guaranteed.

Call George Swirlyk (212) 732-6620 N.Y. (201) 232-6100 N.J.

SYSTEMATICS, INC.

191 Main Mountainside, N.J. 07042

Rapid
Pick-up &
Delivery

COMPUTERWORLD

Computer-Printed Plastic Credit Cards Speed Check Cashing at Supermarkets

MADISON HEIGHTS, Mich. — A development in computer processing on plastic addressable plastic identification cards directly from computer tapes will help Southern California supermarket shoppers cash more than 65 million checks this year.

The System Corp. will supply plastic identification cards. Welcome Check cards preprinted to continuous forms for direct computer printout to Telecredit, Inc. of Los Angeles.

Telecredit is mailing the plastic check-verification cards to supermarket chain store customers from Santa Maria south to the Mexican border. The company expects to cover the entire state by year-end. Welcome Check cards bear the name and number

of the store at which the customer applied, and enable card holders to cash checks without going to the store where the card was issued. When checks are presented at stores other than the store of issue, the manager will telephone Telecredit for verification of customer's check cashing history. The computer will then verify the check and day, seven days a week, and can verify checks in 20 seconds.

The consumer pays only a small fee when the check is written for more than the amount of the purchase, or is cashed without a sale.

Alex M. Beerbom, president of Telecredit System, said that before his system was perfected, production was limited to embossed plastic cards individually typed

at the rate of approximately 2,500 in 24 hours. "Using these plastic cards, spread around the check, it is possible to process 28 System cards ready for mailing at the rate of one million a day, and at a cost about half of that of the embossed cards," he said.

System Will Aid Railroad Repairs

JACKSONVILLE, Fla. — Seaboard Coast Line expects to become the first railroad to use a computerized fault diagnosis system to diagnose the repair and maintenance needs of locomotives while they are on the move.

It will be comparable to measuring the heartbeat, blood pressure, temperature, nervous system, and other functions of the human body while running at top speed.

Electronic monitoring equipment, designed by IBM to record the performance of 96 operating facilities, will be used. The system will be installed on 20 powerful locomotives that will begin service on SCL tracks by January 1970.

Performance data collected by the monitoring equipment will be recorded on a magnetic tape and transmitted to a computer at SCL's Jacksonville base for analysis.

If the computer — an IBM 1800 data acquisition and control system — discovers a potential malfunction in a locomotive, it will print information on the repairs or maintenance needed. A mechanical crew will then be directed to service it.

We added verifying to your card punch

DO YOU SOMETIMES REQUIRE MORE PUNCHES OR VERIFIERS IN A HURRY?

THE WUCU/DRC VERIFIER ADAPTER GIVES YOU BOTH AND SAVES BY:

- Significantly reduced capital equipment or rental costs.
- Higher operator efficiency . . . correct cards immediately when errors are detected.
- Reduction in floor space.
- Rents for \$28 per month.
- Compatible with IBM-24, IBM-26, and IBM-29 card punches.

To save on your data processing costs . . . call, wire or write:
WESTERN UNION COMPUTER UTILITIES, INC.
2455 East Sunrise Boulevard
Fort Lauderdale, Florida
Phone 305-563-6141

Distributed by

Western Union Computer Utilities, Inc.

Manufactured by

Data Research Corporation



We are currently looking for COMPUTER PEOPLE who consider themselves in the

TOP 20% OF THE FIELD —

Our openings are with the leaders of the industry in advanced test and measurement system development. (We are leaders because we placed the leaders!)

If your interests are:

- SALES — HARDWARE or SERVICES Unusual potential up to \$50,000
- COMMON/ON-LINE SYSTEMS Design, development, and sales
- HARDWARE/ENGINEERING Logic/Digital/Circuit Design
- Openings from Jr. to V.P. Levels



Career Consultants in the EDP Field
Call collect or write office nearest you:
231 5th Avenue, New York, N.Y. 10010
(212) 554-1000, 554-1010, 554-1011
Route 4, Box 36, Santa Fe, N.M. 87501
(505) 432-4326

The key to success in the computer industry is not hardware, software, or packaged programs, but PEOPLE.

Computer Guidance Corporation has expanded to Chicago and Los Angeles. Together with our New York office we can now offer the best, most complete service for finding you a competent professional staff. Our Associates are experienced in all phases of systems, programming, and management—while our clients are the foremost computer users and manufacturers. Positions are being searched on an exclusive basis.

For more information on our service, Call or Write

John Tutunjian, V.P.
777 Third Avenue
New York 10017
212-758-3760

Robert Fairbank, V.P.
500 North Michigan
Chicago 60611
312-644-1282

Harry Laur, V.P.
6151 Century Blvd.
Los Angeles 90045
213-641-8844

James Redsecker, Dir.
633 Marginal Road
Paramus, N.J. 07652
201-265-5366



COMPUTER GUIDANCE CORPORATION
NEW YORK • CHICAGO • LOS ANGELES



Medical student responds to question posed by the computer while looking at a related slide.

Medical School Uses Computer-Assisted Instruction to Keep Doctors Up to Date

COLUMBUS, Ohio—A program of computer-based medical instruction has been initiated here to help keep physicians and other health professionals in rural and remote communities abreast of new developments in medicine.

The Ohio State University's College of Medicine is conducting the pilot education program under a grant from the U.S. Department of Health, Education, and Welfare.

The project, part of the Regional Medical Program, is an outgrowth of the college's research in the application of computers to medical education.

Dr. Lloyd Evans, assistant dean, said computer-based in-

struction for students has proven successful and should be equally useful in helping practicing physicians and other health professionals learn as their schedules permit.

"One of the traditional problems of medicine," Dr. Evans pointed out, "has been the time required to disseminate new medical developments and techniques to practicing physicians. This kind of system should do a great deal to relieve that problem."

Hospitals Participating

To initiate the program, computer terminals are being installed at four Ohio hospitals and linked via telephone lines to an

IBM 360/40 at the college. The hospitals are Grant in Columbus; Marion General, Marion; Holzer, Galipolis; and Licking County Memorial, Newark.

Once the doctors become familiar with computer-assisted instruction (CAI), they will be able to draw on a variety of programs, including retrieval of the latest information about the medications and treatments available for a particular disease. They may also take refresher courses in their area of specialty.

Drugs May Be Next

Dr. Evans explained that the latest drug development may also be made available to doctors through the system.

The IBM 1050 terminal to be used in each hospital has a companion slide projector which permits health professionals to view color slides of such things as tissue samples, illustrations, or other material.

Individuals taking these courses will respond to a series of tutorial questions posed to them by the computer so that they may evaluate their own progress at learning the material presented.

The system rewards right answers with advanced material and tutors as necessary when the learner does not completely understand the subject matter. The system also has the option to an outside source, such as a professional journal, for further background before proceeding.

Each participant proceeds at his own pace, and is guided to correct answers if necessary.

Other Courses

In addition to serving the educational needs of practicing physicians, the system will offer specific courses of instruction to nurses, physical therapists, dietitians, and other health professionals.

In the undergraduate medical and dental curricula at Ohio State, CAI tutorial programs are available on a voluntary basis. These include anatomy, histology (cell study), and physiological chemistry.

Currently, OSU's first year medical class and the second year dental students are using the system.

"Computer-assisted instruction is an extension of personal instruction, allowing students to learn at their own pace and at times of day when classroom instruction is not available," Dr. Evans said.

"We hope that the system will indicate that we can reduce the amount of time required to prepare a physician for the practice of medicine, and at the same time provide a flexibility which will enable the physician to adapt to individual needs."

"CAI is not viewed as the solution to all instruction problems, but rather, as a means of providing tutorial evaluation and instruction on certain critical points. CAI can serve to test and assimilate knowledge in a given subject area rather than become the primary instructional method."



faster than a speeding Fortran...
able to solve tall programs in a single run...
more powerful than any other Fortran system...

Xtran



Disguised as Com-Share's XTRAN, this new super language can be used to create, modify and test programs that can later be transferred to in-house computer systems for production purposes. Compile, debug and execute time is greatly minimized. If your problems require XTRAN, call:

Com-Share
INCORPORATED

Ann Arbor, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dayton-Columbus, Detroit, Minneapolis, New York (Metro Area), Philadelphia, Pittsburgh, San Francisco, St. Louis, Toronto, Washington, D.C.

Optical Character Reader Used by IBM To Speed Analysis of Installation Data

WHITE PLAINS, N.Y. — An optical reader device is being used to speed analysis of data on installed IBM information handling systems and equipment.

IBM customer engineers hand print on cards performance data they gather when servicing customer's equipment. The cards are read by an IBM 1287 optical reader, and the data is entered

directly into a 360/30.

In the flying spot technique used by the 1287, a moving beam of light, generated by a cathode ray tube reads the reports by spiraling over hand-printed characters. The computer records the data on magnetic tape and transmits it over telephone lines to IBM's central processing installation at Mahwah, N.J. for further analysis.

This information forms the main data base for IBM's Field Engineering Division, which installs and services the company's information handling systems and equipment. It is used to analyze product performance, improve existing designs and future products, and to provide specialists in developing more efficient techniques for servicing equipment.

The new program went into effect last month in the division's 12 laboratories, which includes 12 states from Washington and California to Texas. By the end of summer it will be extended to include all of the United States, an IBM spokesman said.

School Adopts 'Checkless' Method Of Paying Its 130 Faculty Members

HERSHEY, Pa. — A step toward the widely discussed "checkless" society is planned by the Hershey School.

The system will be implemented with the help of an NCR Century 100, scheduled for delivery to the school next winter. Instead of receiving paychecks, the school's faculty and staff members will receive only the computer-prepared statements normally appended to paychecks. Duplicate data will be forwarded to the Hershey National Bank, and the bank will credit the payers' accounts with the proper amounts. If a payee should happen to be using another bank, the Hershey National Bank will supply the payee a check for him to present for deposit at another institution.

"The faculty's reaction to the checkless payroll idea has been extremely positive," said Clyde Ebersole, controller of the school attended by over 1,500 orphans boys. He pointed out that the approach will eliminate the "checkless society" problem. "This is caused by having many different checks going out to individuals and their being cashed at different times at the payees' discretion. Under the new system the entire payroll will go into the various accounts at once. Thus, the bank will be able to deduct from the school's account in an easily accountable amount," he said.

At some future date it is possible that the plan will be extended to include automatic

Pension Checks System Planned

ROME — Beginning in September, the Italian Ministry of the Treasury will use large-scale optical reading equipment to process pension checks. Pension fund checks issued monthly to retired government employees, their widows, or their children. Pension fund recipients cash their checks at 13,000 post offices throughout Italy with the post offices retaining the documents daily to the treasury's Rome data center in batches of about 10,000 checks.

The system, an Electronic Retina Computing Reader, will be issued from Recognition Equipment International.

The ministry expects to realize a major savings through use of the optical reading system since it will be able to prepare the monthly pension checks on line printers for later optical reading.



Hand-printed characters being read by the IBM 1287 optical reader are displayed on the device's CRT.

THE ICP QUARTERLY ISN'T FOR EVERY TOM, DICK AND LYDIA

After a hard day on the set, aging starlet Lydia Libido likes to relax by leafing through the latest issue of the ICP Quarterly Catalog. Lydia, whose latest releases include Poolroom Ballerinas and Vampire Sing-Out, heard that the ICP Quarterly has the world's largest listing of software for sale or lease. The world's largest anything, she figures, must be important. Besides, the word "software" turns her on. Money, of course, is no object to Miss Libido; \$60 for a year's subscription is just a fraction of the cost of a face lift. Besides, Lydia hopes to make a bundle by having the Quarterly adapted for the screen. Why Lydia Libido subscribes is her business. But most people take our Quarterly because they've found that buying software saves a lot of time, talent and money. If that interests you, drop us a heart.

International Computer Programs, Inc.
Dept. A
2511 East 40th Street
Indianapolis, Indiana 46205

I don't know what you're talking about, but send me a copy anyway. I promise to send \$1.00.

Please send me the ICP QUARTERLY for one year. I am Lydia Foster. If after 12 days I do not wish to subscribe, I'll return the copy with no obligation, but keep Lydia.

Name _____
Position _____
Firm _____
Firm Address _____
City _____
State _____
Zip Code _____

|| But most people take our Quarterly because they've found that buying software saves a lot of time, talent and money. If that interests you, drop us a heart.



Who's who in data processing?

Intelligent, imaginative executives. Professionals. Like talented Anthony J. Stoeckert, President and Board Chairman of expanding Diversified Data Services and Sciences Inc.

With eighteen years in data processing, Tony has chalked up an impressive record in management posts at IBM, and more recently as Vice President of a software firm. Last year, convinced that fresh approaches were needed, Tony and his associates established their own company. It is a full service corporation with high performance standards and a superior range of specialized capabilities.

Since people are the key element in any successful business, he surrounded himself with recognized professionals, and now has a staff

of more than 75 serving an impressive list of clients. Among them are the Crum and Forster Insurance Group, Zurich Insurance, Crown Fabrics, almost a third of New York City's taxi fleets, Wells Fargo and Royal-Globe.

Located in new headquarters in mid-Manhattan, DDSS offers services in all major areas of Data Processing — including an on-site IBM System/360 for systems analysis, programming and time sales. Through subsidiaries, it also has capabilities in the fields of telephony and education; and more to come.

Why not find out how Diversified's growing, wide-ranging capabilities can contribute to more efficient operations for your company? Just send in the coupon below. Or call us.

FULL SERVICE...BY PROFESSIONALS...FOR PROFESSIONALS

dis DIVERSIFIED DATA SERVICES AND SCIENCES INC.
105 Madison Avenue, New York, New York 10016 • (212) 889-1800

Gentlemen: I want to know more about your organization's service and capabilities in —

| | |
|---|--|
| <input type="checkbox"/> Systems Design | <input type="checkbox"/> Educational Services |
| <input type="checkbox"/> Programming/Analysis | <input type="checkbox"/> Data Entry |
| <input type="checkbox"/> Feasibility Studies | <input type="checkbox"/> EDP Personnel Recruitment |
| <input type="checkbox"/> Proprietary Programs | <input type="checkbox"/> Data Communications |
| <input type="checkbox"/> Computer Time Sales | <input type="checkbox"/> Facilities Management |

NAME

TITLE

(Please attach this coupon to your letterhead)

Page 40

June 25, 1969

Package Handles the Accounting For Time Deposit Certificates

MIAMI — Time certificate of deposit processing can now be computerized through the use of a system developed by Xerox International, Inc. (formerly International Computing Service) here for the S/360. The basic price is \$6,000 and includes documentation.

The system is Cobol oriented and incorporates the use of disk and/or tape on at least a 32K system of any model, 30 or larger. The program is also available for the Burroughs 5500, in Cobol.

All versions offered include maintenance, complete documentation, and source material. Training is available on a time and materials basis.

Two versions of the program are offered. The \$6,000 version is aimed at the bank which handles its own time deposit processing. A service-bureau version is available for \$7,500 per installation.

According to Mr. Borman, director of marketing for the company, the installations are now under way, and several more are underway. One of the customers, told *Computerworld*, made the alterations for the B5500, and the customer is currently testing the system and preparing the package through Xerox.

Several reports are produced by the system. In general it operates in two phases: update and report. The system calcu-

lates interest on a daily basis, compensating for short months, weekends, holidays, etc. Available are reports for individual certificates for certificates of deposit showing accrued interest, paid today, and outstanding amounts; listing of new certificates; daily interest to be paid; daily listing of certificates; and problem list (input errors, processing errors, etc.).

Several reference reports are produced on request for detail account history, deposits made against loans, weekly analysis by amount of certificates, and analysis by month of maturity.

Xerox is at 8101 Biscayne Blvd. here.



Keno ticket writer uses a Kenotronic terminal as William G. Bennett (left), president and general manager of the Mint Casino, and Joseph A. Ricca, president of Ricca Data Systems, watch.

Please Input Your Bets, Is Newest Gambling Call

LAS VEGAS — Gambling will be easier with a new computerized accounting system for Keno, a number game played in some casinos here.

Kenotronic was developed to handle the game in the Mint. The Mint, by Ricca Data Systems of Santa Ana, Calif., is the first phase of a complete operating system. Ricca hopes to have installed at The Mint by the end of the month.

Keno, a game of ancient Chinese origin, allows a player to select up to fifteen numbers out of eighty possible and place a wager, usually from 60 cents to \$10. The house has a random, 20-numbered ball of ping-pong size from a rotating fishbowl. A player can, against huge odds, win as much as \$25,000 on a single wager.

The system automatically reads and prints the tickets and stores the data on disk. When all tickets have been processed, and the random numbers selected, the computer prints out the numbers of the winning tickets, with their individual winnings, total amounts paid out, and the gross receipts of the game.

William G. Bennett, vice-president and general manager of The Mint, explained that the new Kenotronic system eliminates the inherent problems of hand-written tickets, decreases waiting time between games, and performs other accounting functions.

A winning patron presents his ticket to the machine, which selects 20 numbers and prints them out. After the last ticket is accepted, the randomly selected 20 numbers are displayed and entered into the computer. The computer then scans the ticket, identifies the winning numbers, calculates amounts won, and performs other accounting functions.

A winning patron presents his ticket to any ticket writer, who then scans the ticket and enters it into the terminal. The terminal then prints out a duplicate copy of the original ticket so that the presented ticket can be verified.

The language is English-oriented, and aimed at the presentation of the material through other terminals, enabling the teacher to refine the material and presentation to the student in response from others on a direct basis, according to the company.

The program requires a minimum of 64K of memory and operates on any Model 30 or higher.

| CERTIFICATE OF DEPOSIT PROBLEM LIST | |
|-------------------------------------|------------------------------|
| 11/20/69 | |
| <input type="radio"/> | NO MATTERS |
| <input type="radio"/> | NO MATTERS |
| <input type="radio"/> | 1ST PAYMENT TO AVOID OVERPAY |
| <input type="radio"/> | NO S.L. NO. |
| <input type="radio"/> | NO SAVINGS NO. |
| <input type="radio"/> | NO. OF UNPAID ITEMS |
| 35 | |

Action report prepared by Xerox certificate of deposit system.

Service Offers 2,000 Programs

PITTSBURGH, Pa. — A remote batch computer service called Ritz (remote input terminal system) gives businesses, engineers, and scientists direct access to time-shared computers through local terminals. Located within the customer's plant or at a nearby Westinghouse Tele-Computer Service Center, these terminals can be

used to develop new programs or execute previously written and retained programs. All the compilations and calculations are done on an IBM 360/75 with input and output handled by an IBM 360/50. Data transmission between the two systems is done automatically. According to Westinghouse, over 2,000 already written pro-

grams are available, including: engineering methods analysis, systems modeling, environmental analysis, optimization, technical data, market studies, Camp services for N/C tool programming, and many others. Westinghouse Information Systems Laboratory is located here at 2040 Ardmore Blvd.

NC Tapes Produced via Remote Service

BALA-CYNWYD, Pa. — A time-sharing system for general computer terminals that provides users with terminals and keyboards on their premises to facilitate the control required by production automation.

Called Adapt Plus, the system was developed by Computer Sharing. It produces EIA (standard) coded tapes which can be used to directly control numerically programmed machines in the shop. The system

has an intermediate storage capacity of 2 million characters, provides large storage capacity and great flexibility, the company claims. System diagnostics are on-line, and the editing capabilities provide a high degree of flexibility, a company spokesman said. Programmed tape provides description capabilities including three-dimensional contour maps with either flat or tilted lines. The programs can permit the definition of points, lines, and curves directly from the blueprint.

To aid users in developing tape-to-tape data of numerically controlled equipment, the company explained, CSI is holding seminars and training sessions on-site, and special workshop sessions dealing with practical problems in the NC environment.

GPSS Added to Bureau's Library

PORLAND, Ore. — EDP Center now offers the IBM General Purpose Simulation System (GPSS) to its time-sharing subscribers.

This simulator is used for better determination of the relative importance of different factors in any continuing process of an environment. E. Poole, company vice-president, said that, "GPSS is a set of related programs used to simulate the operations or 'flow' of activities processes and systems of almost any

kind of business or manufacturing process.

He explained that, "In the span of a few hours or even minutes, a computer can 'copy' years in the daily life of a business or industry, analyze the conditions that have run, and 'report' back to management on the results of its work."

GPSS is available from any of the company's sites in Oregon, Washington, and Idaho. Poole said. The company is based here at 1006 S.E. Grand Ave.

Coursewriter Available for DOS/360

WHITE PLAINS, N.Y. — Coursewriter, IBM's programming system for educational materials and course planning, has been expanded to operate under the S/360 or DOS (disk operating system).

Previously available only for the 1400 and 1500 systems, Coursewriter permits educators and training specialists to enter organized course material into the computer through terminals.

Language Designed to Handle Typesetting Applications

PRINCETON, N.J. — A new language, Ultra-X, for the printing and typesetting industry has been announced by Printing Industries Computer, Inc. It is intended, according to the company, to have as broad a use in the printing industry as Cobol does in the commercial programming industry.

The system is a compiler operating on the S/360 and uses simple format statements to describe typeface changes. Ultra-X converts these statements into pre-programmed routines for in-

structing the computer. Pages can, according to the company, be programmed with only 10% of the instructions required with other languages.

The language also incorporates logical descriptions for page formatting which automatically build the desired formats.

The language is based on the plan developed by Dr. Michael Bennett while at MIT and is aimed at the problem of simplifying communications between the user and the system. A manuscript copy editor who is

not a programmer can learn to use the language in very little time, the company claims. The language is based around 85 two-character words, which in themselves are simple. For example, BB signifies the bottom point size; and TF, the type face.

Operating under DOS, the system can be run under multi-programming. The system enables the operator to produce final page proofs directly, rather

than produce an intermediate galley proof. This will eliminate much of the work associated with such work.

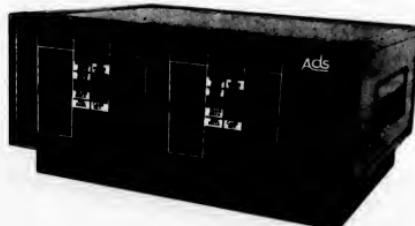
The system is already installed at Arctech National Corp. in San Francisco and several other installations are due soon. The company's offices are located here at 228 Alexander St.

FREE CATALOG-EMP ACCESSORIES

FULLY AUTOMATIC EQUALIZATION AT 4800 BITS/SEC

Another major innovation from American Data Systems—the automatically equalized modem ADS-448—will change the entire data modem picture.

It eliminates the problem of manual equalization and makes for trouble-free data transmission and reception. It operates at 4800 bits per second, which means you get twice the service you would from a 2400-bit-per-second data modem at one-fifth the error rate. Other unique features? The front panel display indicates relative line condition, receiver and transmitter data rates, carrier detection, and receiver phase lock.



ADS

AMERICAN
DATA
SYSTEMS

WRITE OR CALL COLLECT: (213) 882-0020

20747 DEARBORN STREET, CHATSWORTH, CALIFORNIA 91311

Firm Offering 'Debugged' 1108 Software

REDONDO BEACH, Calif. — Software for the Univac 1108 is now available, from Athena Programming.

President of the new company is Dr. Jack Perrin, one of the designers of the 1108's Fortran compiler.

The company is offering a spe-

cialized service known as Cooperative Consulting Service (CCS). The plan permits any subscriber to obtain a plan of the software, fee computations for Fortran and Exec II (one of the 1108's operating systems) bugs discovered at his own or other sites.

Subscribers also receive current corrections and discounts on specific requested system enhancements. The company also conducts a series of tutorial seminars in the use of Exec II and the Fortran compiler. Athena is based here at 1161 S. Pacific Coast Highway.

Data Check Developer Moves to New Office

NEW YORK — Express Software Systems, developer of Data Check Express (CW June 11), has moved from 500 Fifth Ave. to 342 Madison Ave., the firm announced last week. Data Check Express, a system that checks, corrects, formats and merges files, can be learned in two hours by an inexperienced programmer, the company said.

Payroll Service Offered On Time-Sharing Basis

PHOENIX, Ariz. — Payroll processing is now offered on a time-sharing basis by Information Networks Corp., a subsidiary of Wabash Magnetics Corp. The program is available through the company's time-sharing system, and is English oriented for management.

The system handles, according to INC., all the normal requirements of payroll systems, but uses the on-line mode of processing to speed up the delay-time in personnel management.

1130/1800

RELOCATABLE OBJECT LANGUAGE ASSEMBLER LANGUAGE TRANSLATOR "MSA" converts 1130/1800 relocatable object decks to assembly language source. Lists and punches deck with all comments, code specific for 1130/1800, and re-assembles. Saves many words in FORTRAN programs and subroutines. Change conversion tables quickly. Effect system language changes — provides source for IBM 360 system phases. Excellent teaching aid — shows actual code generated by the FORTRAN compiler. Many options.

Information Networks Corp.
2415 W. Stewart Avenue
Flint, Michigan 48504
(313) 768-4402

Subscribe to
COMPUTERWORLD
Today!



CDC's optical scanner reads specially printed codes on the edge of the stock certificate.

OCR Methods Can Salvage Old Stock Certificate

NEW YORK — A strong plea to save the big, old stock certificate and forget the small, newly proposed punched card certificate was made recently by Fred R. Esty, chairman of the U.S. Banknote Corp.

Esty announced that U.S. Banknote and Control Data Corp. have jointly developed a new system for stock certificates 8 in. by 12 in. certificate that makes the certificate machine-readable on an optical character reader engineered by Control Data.

Esty stressed the following reasons for maintaining the old certificate:

- It would retain the current level of proven security.
- The transition to the new machine-readable certificates would not require re-engravings.
- The retention of this size would safeguard the industry

against a chaotic transition that could result from using two different-size certificates.

• The big certificate is much less prone to rapid concealment and easy theft.

• The big certificate is processable with attachments.

A spokesman for Control Data noted that the remote terminals have been developed by CDC yet, but the price would probably be in the \$3,000 range to \$5,000 range through U.S. Banknote.

The speed of the reader is about 15 characters per second and it presently operates through a tie-in to a paper punch for separate coding at a later time.

The unit is not yet in production, but it is expected that initial order quantities could be ready for delivery in about a year, CDC said.

150 Members Indicate Acceptance Of NYSE Block Automation System

NEW YORK — The New York Stock Exchange has demonstrated its Block Automation System to the officers of the more than 150 member brokerage firms and institutions already have indicated they will be part of the system's network when it begins operation around the end of the year.

The Block Automation System uses a computer to match the buy and sell interests for blocks of stock, a matching process now done largely by thousands of telephone calls a day between brokers.

NYSE President Robert W. Haack, in a statement issued in connection with the demonstration, said the NYSE expects to start its computerized matching network with some 200 subscribers. Mutual funds, banks, pension funds, and insurance

companies, as well as brokerage firms, are among the organizations that have signed Letters of Intent since April 30 of this year.

The NYSE last month (ICW, June 4) signed a contract with Bunker-Ramo Corp., under which Bunker-Ramo will manufacture, install, and service some \$2 million in terminal equipment for the officers or subscribers to the system. First orders are scheduled to be installed in September.

"One entry in the system," said Haack, "will be the equivalent of many telephone calls. By having the matching process going on continuously in a computer, brokers will be able to concentrate on the actual negotiation and execution of block trades."

Financial View From Abroad

U.S. Software Firms Are Latest To Invade European EDP Market

By Nancy S. Foy
Special to Computerworld

Hugh Moore, president of Computer Foresight Corp., recently told a WEMA meeting in California that Europe may be the best source of capital for U.S. expansion of smaller technical firms. He suggested that U.S. firms, with turnover in the \$10-million-up range, especially those with European affiliations, ought to be exploring Eurodollar financing.

Perhaps this consideration, combined with the availability of highly skilled programmers at considerably lower salaries, has given impetus to a new "software invasion" of Great Britain.

Xenophobia Strikes

Early this year the U.S. press voiced considerable alarm about the invasion of the British software field by a number of U.S.-based, machine-readable software firms, notably leasing companies looking for diversification and European foothold in the face of an uncertain IBM situation.

One June 4 Lesco announced its Lebusco Ltd., a leading systems/software firm, and began creating a group of its own as well, under the Lebusco Systems and Research banner.

Also last month of the year, Granite Leasing made a \$7 million offer for Management Dynamics Ltd., a fast-growing software/service subsidiary of British Bowes, a U.K. food company. This focus has drawn attention on takeovers, and interest was intensified when Greyhound Computer streaked in under Gordon's more-petulant nose and snatched the British Dynamics away with a \$6.5 million cash offer in Eurodollars. Other leasing companies have quickly established their own outposts and the uprooted subsided after a few weeks.

U.S. Firms Invade

The latest "wave" — penetration by U.S. software companies is not a new phenomenon, as an infiltration of an old one, but both invasions have encouraged a number of enterprises in the United Kingdom to leave more room for imports and to software houses with sufficient扇fare to attract notice from acquisition-minded visitors. Meanwhile, advertisements for programmers, formerly in the £1,800-£2,500 range, now run at £3,500, as £3,500 (£8,400), with management and software sales ads in the Sunday papers running up to £4,500 (£10,800).

The "buy-British" tendency is strong, and some firms have shown an awareness of this. Brandon Computer Services Ltd., which has had a London outpost for four years, flew Dick Brandon in for the late-May meeting, and transferred Bob London, a U.S. vice-president, back to the States, replacing him with Roger

Graham, a British veteran of the Management Dynamics group, with other locals taking over key positions in the new company. (See "For the new Resource Management System (plus some acquisition-hunting) gets under way."

On June 4 Lesco announced its its systems and Research group was being merged back under the Lebusco label, certainly a move to re-establish the firm's British image before the next wave of Yankee-go-home criticism appears in the U.K. trade press.

More Software Firms

Meanwhile software firms continue to arrive, place their ads for individual programmers or enter their negotiations with local software houses. In April IBM acquired a minority interest in London Ltd., a new software firm started by several men from SCSCon (formerly CEIR) and now a totally-British subsidiary of British Petroleum). CSC, which has had a shaky foothold in London for several years, lost its nerve and sold its British arm to a French company, and now concentrates its efforts in Brussels, though the firm continues to look in competitions for major government contracts.

Cybernetics International Corp., fresh from a successful public offering in the U.S., has joined the invasion, this time in conjunction with Bankers' Trust Company, and is now busy headhunting in London. Quieter visits were the mode for firms like Applied Computer Technology and Programming Science (which just formed Programming Services Ltd.).

And Next...

The next "wave" is likely to be in the real-time service area. Already the majority of time-sharing and remote-batch services in London have U.S. origins, though a number of British services (based on SDS Sigma 5 computers) will begin time-sharing this summer in London. Time-Sharing Ltd., a time-sharing pioneer, is a Bolt, Beranek and Newman subsidiary. ITT Data Services, UCC, and GE have outposts here; and IBM and Honeywell will be offering services in a time-sharing mode from existing bureaus, while a number of U.S. time-sharing firms are looking for opportunities to make quick visits to find new homes for old computers that are still economically viable in the less technically demanding European environment.

RCA Buys Four Packages To Distribute to Users

ATLANTA — Management Sciences America, Inc. has announced the completion of contract negotiations with RCA Information Systems Division for the purchase of four bank applications packages.

Terms of the contract grant RCA the right to use, modify, and distribute these software packages for three years. Completion of delivery will be made by August 1 of this year, according to Robert P. Jensen, senior vice-president of MSA.

Software packages purchased by RCA were: Corporate Trust, which provides management information for trust and investment accounts on a daily and/or monthly basis; Time Deposit Accounting, which facilitates management decisions with timely information reporting and handles passbook statement savings certificates of deposit, and Christians Club accounts; Installment Loan Accounting, which provides daily or weekly processing and offers a choice of interest methods for loans on a monthly basis; and Commercial Loan Accounting, which handles demand term and time loans either on a discount or add-on basis and provides comprehensive management reporting with option selection.

A spokesman for RCA said that the four packages will be

added to the line of packages already available to all banks purchasing the Spectra 35 and up computer system.

Hazeline Corp. Declares 25% Stock Dividend

LITTLE NECK, N.Y. — The board of directors of Hazeline Corp. has declared a 25% stock dividend on its common stock payable June 21, 1980, to stockholders of record on May 10, 1980, and has ordered \$7,838,320 transferred from retained earnings account to the common stock account.

This represents the approximate amount of stock to be issued. Fractional shares of common stock will not be issued.

UCC Charges Gulf Group To UCC Financial Corp.

DALLAS — University Computing Co. has changed the name of its wholly owned financial subsidiary from Gulf Group, Inc. to UCC Financial Corp. August R. Bucher, president of UCC Financial Corp., reported that the new name is "more consistent with the additional role the financial company anticipates as an investor in UCC computer systems and high-technology companies in fields of interest to UCC."

New Registrations

REALDATA CORP., 935 Hamilton St., Somerville, N.J. 08873, a company engaged in the design, development, and manufacture of computers and prospective uses of computers, filed to register 330,000 shares of common stock.

Proceeds, at \$3 per share, intended for the development and manufacture of the company's proposed turn-key information systems for the construction, mining, chemical, food, pharmaceutical and school governments, and for the development and manufacture of proprietary systems and consulting services in the areas of management consulting, systems analysis, and systems services. The underwriter is Charles P. Pugh, Inc., 200 Park Ave., New York, N.Y.

AYVON CORP., Fort Washington, Pa. 19034, a company engaged in the acquisition and operation of telephone and television equipment businesses, primarily engaged in the design, manufacture and sale of electronic components, electronic products and systems for ultimate use in the telephone and television industries, filed to register 300,000 shares of common stock. Of these 150,000 are to be offered at \$10 per public sale by the company and \$160,000, being offered by the underwriter, for other holders.

Proceeds, at \$15 per share maximum, intended to repay bank indebtedness assumed in the acquisition of Hudson, Inc., St. Cloud, Minn. Indebtedness incurred upon such acquisition is to be repaid by the company in the acquisition of Raynor Corp., Inc., St. Paul, Minn. Indebtedness for working capital loans, to be repaid by the company, for equipment notes, the underwriter, at \$10 per share, for the acquisition of One Whitemarsh St., 5 Hanover Square, and C.B. Richard, ERH & Co., both of New York, N.Y.

DIAL-DATA, INC., 429 Waterman St., Newton, Mass. 02158, a company engaged in providing time-sharing services, filed to register 300,000 shares of common stock.

Proceeds, at \$10 per share, intended to repay bank indebtedness, for financial expansion, for the acquisition of a new office, rentals owned to \$20, for expansion of computer centers, for payment of past due accounts, and for the purchase of three computer leases with \$20,000 per year, for the acquisition of new office offices. The underwriter is Sup. Moisy, Chase & Kerner, Inc., 1500 Walnut St., Philadelphia, Pa.

TEXTX COMMUNICATIONS CORP., 6 W. 44th St., New York, N.Y. 10017, a company engaged in providing a work-processing service, under the name "Textcom," filed to

register 100,000 shares of common stock.

Proceeds, at \$7.50 per share, intended for the design, development, and purchase of equipment, and for the payment of debts and expenses incurred in connection with the company's proposed program. The underwriter is Cuniverus & Co., Inc., 1341 Main St., Springfield, Mass.

TERMINAL EQUIPMENT CORP., 750 Hamburg Twp., Pompton Lakes, N.J. 07442, a company engaged in the manufacture and installation of information processing equipment. Filed to register 100,000 shares of common stock, \$10 per share maximum, intended for the development and research. The underwriter is Milton D. Bassett & Co., Inc., 1000 Broadway, New York, N.Y. 10036.

COMPUTOCO. CORP., 421 Hudson St., New York, N.Y. 10014, a company engaged in the application of computer technology to the printing industry, filed to register 100,000 shares of common stock. Proceeds, at \$8 per share maximum, intended for the development and research of a specialty designed computer system which will be used by the company for the control of salutes and training of up to 200 keyboarding operators. Proceeds will be used for the purchase of new programmers and training costs, for the purchase of new computer machines, for rental of additional premises for computer connection, operating expenses, and for the purchase of additional type fonts for the computer and other computer equipment. The underwriter is Bassett & Co., Inc., 1000 Broadway, N.Y. 10036.

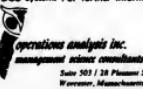
CORPORATION FOR INFORMATION PROCESSING PLANNING & DEVELOPMENT, 401 N. Harvard Ave., Camarillo, Calif. 93011, a company engaged in the provision of professional consulting services with emphasis upon the application of computers in performing research, systems, and product planning, and development, and the design, development, and implementation, filed to register 100,000 shares of common stock.

Proceeds, at \$5 per share, intended to repay indebtedness, to implement a research and development program related to financial planning, financial simulation, and product planning of commercial and military computing systems, and to provide financial consulting services. The underwriter is Charles P. Pugh, Inc., 200 Park Ave., New York, N.Y.

360 SALARY SERVICE SYSTEM

Designed Expressly for Data Processing Service Organizations

Processing time including all updating, averaging, and reports average less than one second per employee per Friday morning. Input to 1000 records, 1000 reports for any period. Multi-user six routine, DDA and ARP interfaces. Processing options include spooling, multiprogramming and multiple printers. Written for 84K for larger DOS systems. For further information contact Jim Sevino.



Suite 303 / 28 Pleasant Street,
Wellesley, Massachusetts 01842
Telephone: 784-7894

COMPUTER RELATED SERVICE COMPANY ACQUISITIONS

Our company is searching for computer firm acquisitions, in fields such as: service bureaus, time sharing, consulting, education, proprietary programs, peripherals, leasing, etc. If your company has a strong technical capability in these areas, EDP Planning will match your strengths and needs to the requirements of other computer companies. These companies can provide fast growth in good markets, financial strength, and profits.

EDP Planning treats all information concerning your company as confidential. Company identities are not exchanged without your permission. Our company will also provide assistance in working out equitable merger arrangements.

Please send information concerning your business, or reply with a person to contact, to:

EDP PLANNING AND DEVELOPMENT COMPANY
P.O. BOX 422 RIDGEWOOD, NEW JERSEY 07441

COMPUTERWORLD

A NEW GENERAL PURPOSE PAYROLL AT 1/4th USUAL COST...ALL STANDARD FEATURES...PLUS

Minimum Computer Equipment Configuration —

- IBM System 360 Model 30 or above
- 32K Core Including Supervisor
- Either Disk or Tape Oriented
- Disk May Be Either 2311 or 2314
- 3 Tape Drives for Totally Tape Oriented System

A Multiple Company Service Payroll with Complete Flexibility for Reporting Regular Time, Overtime, Shift Premium, and Up to 8 Other Company Defined Payments. Extensive Tax Calculations.

PAY PERIODS — Weekly, Bi-Weekly, Semi-Monthly, Monthly

ACCUMULATION — By Quarter and Year-to-Date

OTHER FEATURES — Includes Multiple Checks and Automatic Deposits. Payroll and Labor Distribution from Same Input.

EXTENSIVE PERSONNEL INFORMATION — For Ready Retrieval TOTAL PRICE — \$4500

INCLUDES — • Complete Systems and Programming Documentation

- On-Site Customer Orientation & Instruction
- Full 1 Week Installation Assistance If Required
- 90 Day Guarantee Against Program or System Errors
- One Year Systems Maintenance Option — \$800

AVAILABLE — Delivery and Installation 60-90 Days from Contract

For Further Information Write or Call

GENERAL COMPUTER SERVICES, INC.

HUNTSVILLE INDUSTRIAL CENTER

P.O. Box 4183

Huntsville, Alabama 36802

(205) 539-5482

SENIOR SYSTEMS ANALYSTS

we have your next
two jobs.

Your second one being Project Manager. In fact, if your talents and experience are already those of a Project Manager, but your title isn't, we'll promote you the day we hire you.

That's because we're looking for the kind of talent and competence that will move us along on our four new and significant corporate projects. With no delays on either end.

However, if your aim is to gain the benefit of experience which can only be offered by the corporate world, the projects you choose will involve you in studies of market objectives and decision-making processes that will help to close the professional gap between your present capabilities, and those of a project manager.

Now evaluate your qualifications and interests to these projects:

1. Marketing Information-Decision System.

Its purpose is to improve our knowledge of market conditions and behavior, competitive strategy and actions. You will be concerned not only with designing hardware/software processes and techniques, but also with the means by which performance of these processes is to be monitored and controlled.

2. Transportation Management Information System.

You'll develop an accounting and management information system for our worldwide fleet of more than 1000 company-owned and chartered vessels. It involves the compilation of information from many sources to optimize voyage accounting methods which our company will adopt.

3. General Produce System

Its design is to implement billing, payroll and other accounting systems into our newly acquired non-banana produce companies. You will integrate the accounting functions of these companies into United Fruit's accounting system. Occasional travel to West Coast.

4. Baskin-Robbins/A & W International/A & W Food Services of Canada, Ltd. After you design a financial system for United Fruit's food subsidiary in Wyoming and Los Angeles, you will supervise the installation of an accounting and financial information system. You will also integrate these systems into our corporate financial information system. Periodic travel to Canada and West Coast.

All assignments are at our Boston based headquarters. And require a minimum of a Bachelor's degree with 3-5 years' experience in data systems analysis and design. A knowledge of accounting and financial systems would be an asset.

For prompt consideration, please forward your resume and salary requirements to



Mr. E. Connolly
United Fruit Company
Prudential Center
Boston, Mass. 02199

An Equal Opportunity Employer

WHERE DO GOOD COMPUTERS GO WHEN THEY DIE?

Well, they don't die and they don't fade away. Their useful life is limitless.

For a free booklet about the Second User Market and a Better Way to buy, sell, or lease proven second and third generation computers, write or call:

CMLS

COMPUTER MULTIPLE LISTING SERVICE, INC.
910 Seventeenth Street, N.W. • Washington, D.C. 20006
(202) 659-1562

(Broker Membership Information Also Available)

DATA PROCESSING: Sales / Service / Supplies

COME GROW WITH US!

CYBER-TRONICS is a young, growing organization that specializes in supplying the data processing needs of business and industry on a nationwide basis.

DRAMATIC ACCELERATION

has created immediate openings in several of our divisions in the ATLANTA, CINCINNATI, CLEVELAND, DENVER, DETROIT, & LOS ANGELES areas.

Customer Service Division:

Customer engineering is a responsible and rewarding segment of CTI. Qualified people are finding unlimited growth potential both financially and professionally. If you have prior experience in the repair and maintenance of Unit record and Computer equipment, there is a future for you with CTI.

Equipment Division:

Outstanding opportunities exist in the field of direct sales and rentals of EAM and EDP equipment for real motivators, capable of persuading others to act and having direct sales background and knowledge of EAM/EDP EQUIPMENT. Excellent sales incentive program plus opportunity for advancement.

Hackett Supplies Division:

Sell for a leader in the punch card and data processing supplies field. Experienced salesmen or trainees just out of college are invited to apply for the opportunity of a lifetime.

Submit resume to: Director of Personnel
Local interviews will be arranged



CYBER-TRONICS, Inc.

4 Novena Drive
New Hyde Park, N.Y. 11040

Programs Aimed at Helping Farmers

DES MOINES, Iowa — A firm with long experience in using EDP internally has set up Pioneer Data Systems, Inc. to offer software packages to both agriculture and business.

The new corporation is a wholly owned subsidiary of Pioneer Hi-Bred Corn Co., a large breeder and producer of hybrid seeds and poultry.

The parent company has been using EDP in its research program since 1950, and has expanded its use of computers into marketing functions in 1962.

President of Pioneer Data Systems is Dr. Larry Baker, who joined Pioneer in 1960 after completing his education at the University of Minnesota. The parent company will continue its internal computer department as a separate operation.

According to Baker, the new company will specialize in two main types of software packages that can be adapted to a wide variety of businesses, and agriculture programs.

The parent company's experience in using EDP to solve agricultural problems gives it a definite advantage in this field.

Most of the present computer programs offered to farmers merely mechanize bookkeeping, says Baker. In contrast, Pioneer's program will gather records so that they can be used for planning.

"With our program, a farmer can predict the effects on income of shifting from one crop to another, of increasing crops

New Companies

while reducing livestock, or of going into a heavy livestock program," Baker pointed out.

"He can decide if obtaining additional capital will increase his income, or whether hiring more labor will result in more or less profit," he added.

Tri-Comp Will Help Government and Banks

MINNEAPOLIS — Organization of Tri-Comp Corp., a company that will specialize in total data processing support systems for governmental agencies and the banking industry, has been announced.

President of the new corporation, which will be headquartered in the Minneapolis National Bank Bldg., 8101 Biscayne Blvd., is George Gorgol.

Gorgol achieved national recognition in the computer industry as director of the City of Chicago's data processing division. He also will continue as president of XIOX International, Inc., a Miami-based computing service firm.

The new corporation was formed to fill an urgent need in data processing support systems for specific activities, initially concentrated in the governmental and banking fields.

The organization is based on the concept that a majority of agencies cannot feasibly or economically acquire data processing as an internal function, or even as a joint function within a government agency.

Tri-Comp Corp. will develop complete and pretented systems in both areas to provide complete and central operating facilities. These will operate through terminal equipment located in the user's facilities with internal staffs trained by Tri-Comp technicians, the company says.

Western Union Joins To Form Computer Firm

NEW YORK — Western Union Telegraph Co., Inc. and Advanced Research Corp. of Washington, D.C., have formed the American Communications Corp.

Bernard Rider, formerly assistant vice-president of engineering for Western Union, Government Communications Systems Department, has been elected president.

The corporation's offices will be located at 1501 Wilson Blvd., Arlington, Va.

In announcing the new venture, Rider explained, "The new corporation was undertaken to pool certain unique skills and to provide research, development, and analysis of communications systems, initially for communications categories of federally funded studies, then later, in service and commercial contract areas."

This announcement is neither an offer to sell nor a solicitation of an offer to buy any of these securities. The offering is made only by the Prospectus.

NEW ISSUE

200,000 Shares Autocomp Incorporated

Common Stock (\$50 per value)

Price \$8.50 per Share

Copies of the Prospectus may be obtained in any State only from such of the several underwriters as may lawfully offer the securities in such State.

Mason & Company Incorporated

Gregory & Sons Thomson & McKinnon Inc. D. H. Blair & Company

Ferris & Company Raascher Pierce & Co., Inc. Satro & Co.

First of Michigan Corporation Herzfeld & Stern

Howard, Weil, Labounsky, Friedrichs Roberts, Scott & Co., Inc.

Chas. W. Scranton & Co. Anderson & Strudwick Cooley & Company

First Securities Corporation First Albany Corporation

Hugh Johnson & Company, Inc. Sade & Co.

Dabbs Sullivan, Tralock & Company, Inc. Henry F. Swift & Co.

Vignerie, Hayne & Chaffie
Incorporated

May 28, 1969

Contracts

Air France has awarded Raytheon a \$980,000 contract for additional digital information display systems to be used at Only Field, Paris. Air France has ordered 12 of these displays, called DIDS-400 (digital information display systems), and 72 special printers, which will comprise an automatic boarding system at the airfield. The system is designed to move passengers more efficiently through the air terminal and speed boarding operations on Air France aircraft.

Computer Applications Inc. of New York City has renewed its contract with NASA for the continuation of technical support of the agency's Goddard Institute for Space Studies in New York. The 8-month, \$25,000 contract covers computer computing and related support services. In addition to providing basic mathematical analysis and computer programming support, Computer Applications is responsible for maintenance of a major computer center, the continuation of operating systems software for that center, electronic and mechanical research instrumentation, and technical library services.

Data Dynamics, Inc., Los Angeles, has received an \$81,600 contract for its Stax scientific tax processing system from Pan Beach Corp. in Florida. The contract covers the first two phases of a four-phase, \$340,000 program designed to analyze information requirements and implement a data processing system that will assist in county assessment of property.

The Department of the Army has awarded a \$232,000 contract to Milgo Electronics Corp. of Miami, Fla., to furnish three Autocomp-1000 Command Data Equipment Systems. The Milgo systems, known as Arcade, will be installed at the Army's White Sands Missile Range in New Mexico.

Design Technology has been retained to undertake mechanical engineering and industrial design of new products developed by Computer Products, Inc., a Fort Lauderdale-based electronics manufacturer.

Superior Motels, Inc. of Hollywood, Fla., has signed a contract subscribing to the automated reservations service of International Reservations Co., a computer-based reservations network for hotels, motels, auto rentals, travel agents, corporations, and airlines.

Data Prep, Inc.

DIRECT MAIL
DATA PROCESSING
and
DATA CONVERSION
SPECIALISTS

228-A Post Avenue
Wenbury, N.Y. 11560
516-333-7866

Digital Development Corp. has received a follow-on contract for production of DDC 73 memory subsystems from the Industrial Products Division of Texas Instruments, Inc., in Santa Clara, Calif. DDC supplies rotating digital memory subsystems used in a variety of computer and industrial process system applications.

Cherokee Management and Computer Services, Inc., a subsidiary of Perfect Fit Industries, Inc., has accepted a contract from the North Carolina State Corp. of North Carolina for complete computer programming services.

Orders and Installations

The Greek Atomic Energy Commission of Athens, the sole nuclear research facility in Greece, has contracted for two Control Data computer systems: a multiprogramming CDC model 3300 and a medium-scale CDC 1700 System. The Greek AEC, a member of the CERN international research and development facility and data center in Switzerland, will use the CDC 3300 to format and edit source data, mainly in the area of high energy physics, for processing on the larger CDC 3300.

Three companies have ordered Honeywell Model 120 computer systems from Honeywell-Breitling Tool Co. of Chicago. Chase Brass & Copper, Inc., of Shaker Heights, Ohio, and Victor Equip-

ment Co. of Denton, Texas. All systems will be employed for general office purposes. LMIC, a New York automation consulting firm and DP service, has received three data communication system units from Community Corp. of New York. Two Community 105 I/O terminals and one Community 550 data terminal with magnetic tape conversion unit will be employed in automation programs specially designed for low-budgeted operations.

Installation is underway on a Univac computerized communications system at MacDill Air Force Base, Tampa, Fla. The system, featuring a Univac 418-11, will provide the U.S. Air Force and U.S. Strike Command

with an automated entry into the government's Autodin network. In addition, the system will increase file storage, data storage, an FH330 Drum, and four Uniservo VI-C magnetic tape units.

Red Food Stores of Chattanooga, Tenn., will install an NCR Century 100 to process store orders and speed up the movement of merchandise from warehouse to customer.

General Electric's Lamp Metals and Components Department ordered a GE-405 information system for use in centralized general accounting, including payroll, billing, and also for manufacturing production and efficiency reports.

there's only
one



The keyboard is so simple any unskilled operator can encode a message and scan it for accuracy. He can then transmit the message a bulletin over a network line. With North's Acoustic Coupler he can transmit over switched telephone networks.

Easily changed overlays serve as a template for the operator to read and in the message of the job and areas coordinated with a program plug that automatically encodes required fixed data into the message.

The Message-Compose! System can transmit messages to any point and automatically operate through standard push, predict, punch cards, key tapes or typewritten copy—all three if required.

Truly the most spectacular breakthrough in data entry and retrieval in years!



NORTH ELECTRIC

Electronics Division/Galion, Ohio 44833/419-468-8100
A subsidiary of United Utilities, Incorporated

Mohr Made Bunker Ramo President; MacIntyre, Chairman

OAK BROOK, Ill. — Dr. Milton E. Mohr has been elected president and chief executive officer and Malcolm A. MacIntyre has been elected chairman of the board of the Bunker-Ramo Corp.

The restructuring of Bunker-Ramo's top management was announced by Mohr following the annual orientation meeting of the board of directors.

MacIntyre, a former undersecretary of the Air Force, has been a director of Bunker-Ramo since formation of the original company in 1967.

Mohr, who has served as chairman for the past year, will be the primary administrative and operating officer of Bunker-Ramo, as its president and chief executive officer. Mohr said the changes were made to give him more time to overall corporate operations and the efficient attainment of projected corporate goals.

William H. Rous, who had been president, had previously an-

Executive Corner

ounced his resignation to devote more time to his public and personal interests.

MacIntyre will continue to serve as president of the Chemical Division of the Martin Marietta Corp., which owns a substantial stock interest in Bunker-Ramo.

Following his service as undersecretary of the Air Force from 1957 to 1959, MacIntyre was president of American Airlines from 1959 to 1963. A graduate of Yale University and the Yale Law School, and was a Rhodes Scholar at Oxford University. He practiced law in New York City from 1946 to 1957, specializing in finance, tax, and labor matters.

MacIntyre is a Trustee of the Carnegie Corp., a member of the board of the White Plains Hospital, and recently completed a

three-year term as mayor of Scarsdale, N.Y.

Booth Announces Top Appointments of Officers

SAN FRANCISCO — Appointments to two top management positions at Booth Computer Corp. have been announced by D.P. Booth, Jr., chairman of the board.

Ronald F. Morrison has been appointed president of Booth Resources International, Inc., a subsidiary of Booth Computer, and Howard F. Vultee Jr. has been appointed to the position of vice-president of corporate development.

Morrison was formerly director of marketing for IBM in Latin America and, more recently, a vice-president with Marshall In-

He is an engineering graduate from the University of California and has an M.B.A. degree from the University of California Graduate School of Business. Following joining Booth Computer-

er, Vultee was associated with Eastern Dillon, Union Securities & Co., New York. He is a graduate of Princeton University and holds a law degree from the University of Switzerland. He also holds an M.B.A. degree from New York University.

Renwick Specializes As GT&E Data President

NEW YORK — John B. Renwick, who has been an officer of two subsidiaries of General Telephone & Electronics Corp., since late 1967, will now serve exclusively as president of GT&E Data Services, Inc.

Because of the extremely rapid growth of GT&E Data Services, Renwick will relinquish his responsibilities as vice-president and controller of telephone operations of the company.

Renwick was elected vice-president and controller of telephone operations in 1966, and president of GT&E Data Services at

the time of its establishment the following year. He was vice-president and controller of General Telephone of Florida prior to joining the telephone company.

A native of Monroe, La., Renwick received a B.S. in commerce from Northwestern Louisiana State College and a certified public accountant certificate from the University of Illinois. He was associated with Theodore Gary and Co., which subsequently merged with GT&E, prior to joining General Telephone of Florida.

Two Added to CUC Board

GREENWICH, Conn. — Dr. Cuthbert C. Hurd, chairman of the board of Computer Usage Co., Inc. since 1962, has been named chief executive officer and chairman of the executive and financial committee. He will devote full time to his position in Computer Usage Co. and will maintain his office at corporate headquarters in Greenwich, Conn.

James E. Starnes, formerly head of operations for CUC, has been elected president and chief operating officer of the company. He has also been named to the board of directors. Charles Benton Jr., who has been serving as president and chief executive officer of CUC since July 1988, has resigned because of illness.

As president of CUC, Starnes will be responsible for directing all firm operations, including company, including marketing and implementation of all systems. Before joining CUC in December 1968, Starnes was director of IBM's data processing activities with the Defense Department and the military services.

LINK UP

WITH OUR IDLE COMPUTER TIME
WE ARE NOT A SERVICE BUREAU...JUST A REAL TIME INSTALLATION WITH UNUSED BACK-UP!

N.Y.C. & N.J.
2-512K 360/50's, 0-2314's, 2311's, 789 Track to 10,000 BPI (III & VI's), 2701's, 2703, 2260's, Telephone, 1410/7010 Emulation.

Detroit
64K 360/30, 2311's, 2703, 2260's.

QuickDraw - Computerized Program Flowchart Available DB-2000 Coriolis, Fortran PL/I, QBasic MPS, PERT, ETC. Software Assistance Available.

dc
DATA COMPUTER
New York, N.Y. 10006
P.T.A. (212) 585-8888/15/LA (718) 75-8889/87/CH (212) 585-8889

1401, 1410, 1440 FOR SALE

IPS has several IBM 1400 systems for sale and delivery in the near future. Included are an IBM 1410 BOK with 2002 disc and 7330 tapes, and a 1410 40K with 10 720 111. 1401's include 4K and BK card systems, and 12K and 16K systems with 7330 tapes. 1401 BK and 18K systems with 1311's also available. Inexpensive 1401 D-3 (tape-to-printer only) deliverable in 90 days. Four 7330 tapes available for immediate delivery. We wish to buy 1410 40K tape system with 1402, 1403. For prices and specifications, please call or write.

IPS (201) 871-4200
INFORMATION PROCESSING SYSTEMS, INC.
467 SYLVAN AVENUE, ENGLEWOOD CLIFFS, NEW JERSEY 07632

UNINTERRUPTIBLE COMPUTER POWER CAN SAVE YOU FROM:

ELIMINATE DOWN TIME AND SAVE MONEY!

PLACE THIS 700C SYSTEM BETWEEN YOUR COMPUTER AND THE UTILITY COMPANY.

Front view of standard 700C System Cabinet for slot-through 50KVA. Batteries are separately mounted.

INPUT FREQUENCY 50Hz **LOAD FREQUENCY** 50Hz

INPUT VOLTS 480 **LOAD VOLTS** 480

700C Power System

POWER SYSTEMS & CONTROLS, INC.
DESIGN / MANUFACTURING / INSTALLATION / SERVICE
P.O. Box 1528, 1528 Main Street, West Seneca, NY 14224-1528
Phone: (716) 675-4611 Telex: 72-256111
Fax: (716) 675-4611

Remote Inching Console for mounting in computer operating area.

**Get the Flexibility
you need in
FILE CREATION
FILE MAINTENANCE
INFORMATION RETRIEVAL
with
FILE EXEC.[®]**

By Pioneer Data Systems, Inc.

File Exec gives you great flexibility in file creation, file maintenance, and information retrieval on either tape or disk files.

Written entirely in COBOL, this new system creates files from source data, existing disjoint files or a combination of existing files and source data. After files are created, complete records can be added, data can be added to existing records, fields can be changed and entire records can be deleted.

There's flexibility, too, in FILE EXEC's information retrieval capabilities. This system allows you to select complete records or parts of records based on up to 450 sets of "and/or" conditions. Conditions of selection can be greater than, less than, equal to, or not equal.

FILE EXEC is format independent and allows for re-formatting of complete output records on selected data to tape or disk and/or printer. All of these capabilities are part of the basic system.

Price: \$3,000.

Optional capabilities include provisions for processing variable length files and a general report feature.

Write or call for more details.



PIONEER. DATA SYSTEMS

PIONEER DATA SYSTEMS, INC.
308 Merle Hay Tower
Des Moines, Iowa 50310
AC 515 276-6746

NATIONAL SOFTWARE EXCHANGE, INC.
Station Plaza East, Great Neck
New York, New York 11021
AC 516 482-8480



Nothing's as dead as yesterday's news.

If you're reading someone else's five-day old Computerworld each week, you're defeating our entire purpose in life: to bring you all the news of the computer field as it happens. Not a month later. In fact, we're the only publication that does this... the only weekly for the EDP field. But you know a lot about us already. After all, you're reading Computerworld right now.

News fades quickly in the fast-moving computer industry. And a fresh issue of Computerworld delivered directly to you each week will help make you more efficient. All for only 17.3¢ per issue with a one year subscription. Do us both some good. Fill out the coupon below. If you're an employer, attach your Computer-world routing list. We'll see that everyone on the list gets a wrap-up of the news while it's still alive each week.

| | |
|---|--|
|  COMPUTERWORLD THE NEWSWEEK FOR THE COMPUTER COMMUNITY | |
| 2000 Austin Street, Foster, Massachusetts 01930 • Telephone: 413/586-0000 | |
| Yes, please send the COMPUTERWORLD for ... | |
| <input type="checkbox"/> 1 Year | \$ 9.00 |
| <input type="checkbox"/> 3 Years | \$26.00 <input type="checkbox"/> Bill Me |
| <input type="checkbox"/> Payment Enclosed | |
| AS | |
| Name | |
| Year 1988 | |
| Title Mgr. | |
| Co. IBM | |
| Phone 415/555-1234 | |
| Address 12345 6th Street | |
| City San Francisco | |
| Zip 94102 | |
| Comments Please send me the COMPUTERWORLD | |
| Return to: COMPUTERWORLD 2000 Austin Street, Foster, Mass. 01930 | |
| Please Circle 1 Number and Letter: YOUR TITLE AND/OR FUNCTION? | |
| A. Operational Management (Engineering) <input type="checkbox"/> Computer Professional Staff <input type="checkbox"/> Computer Officers <input type="checkbox"/> Computer Management <input type="checkbox"/> Engineering/Scientific <input type="checkbox"/> Production/Maintenance <input type="checkbox"/> Purchasing <input type="checkbox"/> Other _____ | |
| COMPANY BUSINESS: | |
| 1. Mining or Construction <input type="checkbox"/> 2. Manufacturer/Computer or Data System <input type="checkbox"/> 3. Computer Distributor <input type="checkbox"/> 4. Utility <input type="checkbox"/> 5. Wholesale/Resale <input type="checkbox"/> 6. Consulting <input type="checkbox"/> 7. Computer/DBS Services <input type="checkbox"/> 8. Business Services (incl. Data Processing) <input type="checkbox"/> 9. Government/Military <input type="checkbox"/> 10. Other _____ | |

DO YOU THINK ONCE A MONTH IS ENOUGH?

We feel that 4 times is better,
for more impact and more results.

We're selling direct advertising your products or services to a fast growing group of people who have the money to spend. COMPUTERWORLD is the magazine we think 4 times rather than just once and we feel you should too. It's a leading monthly magazine.

That's why... COMPUTERWORLD has come up with "4 For" Plan.

"4 For" is designed to fully use a 4 times more impact with your advertising program... for only a few dollars more than you would pay for 1 time in a leading monthly magazine.

Check the numbers in the box below and see what we mean.

| COMPUTERWORLD 4 FOR PLAN | | | |
|--------------------------|-------------|----------------------|-------------|
| 1 TIME | 4 TIMES | 1 LEADING MONTHLY | 1 TIME |
| TABLOID PAGE 7" x 10" | \$ 4,284.00 | NOT AVAILABLE | \$ 1,810.00 |
| 8612 x 264.00 | 2,564.00 | 1-mo. (7x10) | |
| 3 col. x 8" | 420.00 | 2/3 page | 1,415.00 |
| 5" x 7" (1/4 pg) | 318.50 | 1/2 page | 1,040.00 |
| 2 col. x 8" | 182.00 | 700.00 | 880.00 |

Based on SWB April 24, 1969

With our "4 For" Plan, you will reach our 20,000 paid subscribers every week for a month (120,000 impressions a month).

For more information, contact your nearest COMPUTERWORLD sales office or Neal White, National Sales Manager, (617) 322-4800.

There, "4 For" then paid.

PHILADELPHIA

MASSACHUSETTS

PRIME TIME

Available Sept. 1
also 2nd and 3rd shifts
Honeywell Series 200
16K configuration
5 tapes—44KC
card reader, printer, and punch

Management Computer
Usage Co., Inc.
888 Washington Street
Dedham, Mass.
(617) 528-2250

128 KEY PUNCH
• Professional Media Con-
version
• Volume Keypunching—
Verification
Phone (617) 899-4851

KEY PUNCHING
\$4.50 per hour
Call 617-746-6210
AUTO-COM, Inc.
15 Main Street Ext.
Plymouth, Mass. 02360

DIGITIZER TIME
2 AUTOTROL 3700's
AVAILABLE TO CONVERT
GRAPHICAL INFORMATION
TO IBM CARDS—40
BY 60 INCH WORKING
AREA, 18.50 PER
HOUR, WITH ON-LINE
PROGRAMMING SUPPORT
FOR SPECIAL APPLICATIONS—
EXTENSIVE
WORK WITH PRINTED
CIRCUITS AND ARTWORK
GENERATION.

DESIGN SYSTEMS, INC.
8 St. James Avenue
Boston 482-2260

CHICAGO AREA

TIME AVAILABLE
CHICAGO NORTH SIDE

IBM 360/40—256K

5 Tape Drives—2401

1 2314

3 Printers—1403

2 Card Readers—2540

1 Card Reader—2601

**FULL OR PARTITIONED USE
CALL**

Memory DATA PROCESSING
(312) 947-1007 Ext. 386
BELL & HOWELL
7165 McCormick Rd.
Lisle, Illinois, 60530

IBM 360/40, 85K, Five Model
3 Tapes, Two 2311 Drives,
1403 N-1 Printer, 2640
Rdr/Pch., All Shifts and
Weekends, Call Mr. Wie-
land at 312-236-4700.

**PLAYBOY HAS
COMPUTER
TIME
AVAILABLE**

IBM 360/40, 256K,
4 Tape Drives,
2314, 1403 N-1, 2540
IBM 360/30, 32K,
4 Tape Drives,
1403 N-1, 2540
Call
Data Processing Director
(312) 642-1000

IBM 360-40
4096, 16K 1403
Processor
0.5 DOS
Key Punching—Program
• COMPUTER TIME CHICAGO
CHICAGO IL 60622
CHICAGO IL 32 922 6621

MICHIGAN

Ann Arbor—IBM 360-30
65K, 4 tapes, 3 disks, 2 selectors,
1 multiplex high speed printer.
Data Management, Inc.
1200 University
Ann Arbor, Michigan
313-761-1800

SALES MANAGER DATA PROCESSING SERVICES

Nationwide Company with a Computer Services Division needs a professional to help expand its specialty of Data Processing for the Life Insurance Industry. At least 3 years experience in computer hardware or software sales and ability to develop marketing strategy. Some travel in Midwest. You'll enjoy excellent salary, plus commissions and expenses, as well as participate in the broad benefit program of an organization with a solid financial base.

Send your work history (including salary) to Box #3071.

EDP PERSONNEL

Major computer
technician is being qualified personnel in sales &

SALESMEN/SALES MGRS:

Software Development
Systems Development
Telecommunications
Time Sharing
Business Systems (RT)
Programmer Analysis
Time Sharing Systems

Salaries range for all categories \$15,000-20,000

Don Howard Personnel
290 Madison Ave (400) 2d NY 10017
Agency fees paid by employer

SYSTEMS ANALYST FOR FOOD WHOLESALER

Leading Western firm requires
person with two or more years
experience in systems analysis
and exposure to management
level of retail food distribution
... Must have knowledge of programming
languages other than RPL... Experience with direct
marketing, grocery distribution...
Position involving the installation
of real-time system. Salary commensurate
with ability. Send full resume and salary requirements
to:

Box #3072

SAN FRANCISCO

**GOOD RATES
ON OUR
IBM 360/30**

65K, 4 high-speed tape drives,
3 2311 disks, 1100 LPM
Printer

Located close to downtown
San Francisco
Easy Freeway access
Free parking facilities available

We are a private user with 2+
shifts available (some prime
time).

Special rate for large quantity,
extended period use.

Cient Sanders
STANDARD BRANDS INC.
500 Paul Avenue
San Francisco, Calif. 94124
Phone: 415-467-5200

Univac 1108

**WOULD
YOU
BELIEVE**

\$585 Per Hour — Prime Shift
(5 hours per month, mini-
mum usage)

Lower rates other shifts

Contact: Bob Cosby (213)
451-5441 Data Processing
Applications, Inc. 1714 18th
Street, Santa Monica, Calif.

• MORE BUY SELL SWAP

IBM Computer Systems and Punched Card Equipment Bought and Sold. International Computer Equipment, Inc. I.C.E., Inc. 123-25th St. N.W. Washington, D.C. 202-293-3910

COMPUTER ACQUISITIONS

WANTS

- COMPUTERS, ALL MAKES
- UNIT RECORD EQUIPMENT

(404) 536-9000 - DIX 2915
ATLANTA, GA. 30329

IBM 1820-I (20K)
Available Immediately
FULL PRICE \$15,000.
Paper Tape I/O,
Flexowriter Included

Computer Brokers Inc.

910-17th Street N.W.
Washington, D.C. 20006
(202) 699-1344

WANTED TO PURCHASE COMPUTER SERVICE BUREAU

Metropolitan New York Area
We are a financially oriented Management Consulting and Service Organization expanding our operations in the New York area. We are interested in part or complete acquisition of a medium sized service bureau. Must have record of growth, profitable operations, and good management. Write to:
Mr. L. M. Ritter
Management Research Associates
Shaker Building
3645 Warrenville Road
Cleveland, Ohio 44122

BUY-SELL-SWAP

Purpose:

- To provide at low cost a general market place for equipment, systems, services, supplies and the like for the computer community.

Requirements:

- Minimum ad size 1 column by 2 inches
- No maximum size
- Borders allowed
- Reverses allowed
- Logos allowed
- Lineage discounts apply to large ad or long run

POSITION ANNOUNCEMENTS

systems programmers

■ Does the installation of a /360 model 67 time-sharing system sound like the start of some interesting systems work to you?

■ Does the fact that you could play a major role in creating a time-sharing system, that may very well be the best of its kind, interest you?

We need programmers from the senior level on down. If you have a Bachelor's degree and 1 or more years of experience using BAL, and would like to keep the satisfaction and experience of working on this system, we'd like to talk with you.

Perkin-Elmer has an impressive growth history with sales of over 151 million evenly divided between commercial and government contracts. We are located in desirable Fairfield County, Conn., less than an hour from New York City.

Send your resume and salary requirements in complete confidence to, or call collect, Mr. R. Dennis, (203) 762-6107, The Perkin-Elmer Corp., Electro Optical Division, 50 Danbury Road, So. Wilton, Conn. An equal opportunity employer.

PERKIN-ELMER

SYSTEMS PROJECT MANAGER

The nation's largest specialty high-order firm is looking for an analyst programmer. Sophisticated 360 hardware configuration with real-time application. Applicant must have a minimum of 4 years experience in systems development and programming 360 BAL and COBOL.

Send resume to:
HAROLD CLARK, Director of Data Processing



Equal Opportunity Employer

BRANCH SALES MANAGER PROPRIETARY SOFTWARE

— Several Openings in Major Markets —

DATA & INFORMATION PRODUCTS, INC.

(A Subsidiary of Applied Data Research, Inc.)

Representatives for

Applied Data Research, Inc. — (AUTOFLOW)

Boole & Liligant, Inc. — (SIS/360)

REP/360

Other DP Products & Services

10 W. Main St.

Park Ridge, Ill. 60068

An Equal Opportunity Employer

INSTRUCTOR-ANALYST

Unusual opportunity in challenging, rewarding position in innovative DP environment. 360 OS with multi-programming and teleprocessing. Teach part time — systems and programming part time. Bachelor's Degree in Business related field, 2 yrs. 360 experience. Excellent benefits and opportunity for growth. Write J.R. Hill, Dallas County Junior College District, Main & Lamar, Dallas, Texas 75202 or call 214-742-1411.

• you feel the time has come to change your environment to the Southern California scene.

• you want to join a governmental agency where growth is the word for the future with stability and benefits among the best anywhere.

• you want to advance your personal achievement in Data Processing by being associated with applications and development among the most advanced in the industry.

Then look at these six task areas with which you could become involved; over 100 new positions are being added in the 1969-70 budget year to keep our data processing activities the most advanced anywhere.

* ADMINISTRATION - PERSONNEL - BUDGET-GETTING

* ENGINEERING - HIGHWAY - PUBLIC WORKS

* JUDICIAL - LAW ENFORCEMENT - PUBLIC SAFETY

* MEDICAL - HEALTH CARE - WELFARE

* PROPERTY - LAND USE - URBAN PLANNING

* RECORDS - STATISTICS

The County of Los Angeles serves over 7 million people, and our annual budget exceeds over \$1.7 billion. We are advanced in data processing applications; and to stay there, we are budgeting nearly \$20 million this coming year. We need capable, competent programmer analysts at several levels. If you meet the minimum requirement stated, we would like to hear from you. College, white desirable, is not required; nor is citizenship, if you have made your declaration of intent.

• Programmer Analyst start at \$3965 or \$1020 mo.
2 Years experience, 1 year COBOL background minimum.

• Senior Programmer Analyst start at \$1048 or \$1170 mo.
3 years experience, 2 years COBOL background minimum.

• Communications - Teleprocessing Analyst start at \$1170 or \$1458 mo.

1 year experience in heuristic systems BTAM - OTAM - FASTER

Some of the benefits are:

- 3 to 4 weeks vacation
- Over 12 paid holidays
- Guaranteed cost of living raise each July 1
- 6-step pay plan, most positions
- Paid Health and Life insurance with options
- Generous sick leave
- Up to 75% of salary retirement system

For further information submit your resume today to:

P. D. Geer
Department of Data Processing
725 Hall of Administration
500 W. Temple Street
Los Angeles, California 90012

or call 1213 625-3611, Extension 64020



FOR SALE

IBM 705 Mod II - 40K
10 each 727 tapes
All, part or time
Greg Electronics
5201 Alhambra
Los Angeles, Calif. 90032
(213) 223-3281

FOR IMMEDIATE LEASE

- IBM 1401 C4, 1402-2,
1403-2, 1406-1, \$2,200.00
per month for 24 month
lease. Also 4K 1401 C3,
1410 C3, 1402-2, 1406-1, 24
month lease. Summit Computer
Corporation, 785
Springfield Avenue, Summit,
N.J. 07901 (201) 273-6900.

FOR SALE

1401 C4 8K
Two each 2311, one each
2941
Central Equipment Company,
Inc.
(816) 221-1211

WANTED
to buy

NCR 315-100 10 to 20K slab,
5 tape system under main-
tenance contract.

Contact:
Gene Rogers
(219) 284-1280
St. Joseph Bank Computer
Center
202 South Michigan Street
South Bend, Indiana 46601

FOR SALE
IBM 704 SYSTEM
BENSON-LEHNER MODEL J
PLOTTER
DIGITAL EQUIPMENT
CORPORATION MODEL 338
PROGRAMMED BUFFER DISPLAY

General Electric Company

TE M P O

P.O. Drawer 00

Santa Barbara, Calif. 93102

Call

T. R. Curry

(805) 965-0551

FOR LEASE

Two 1402 B3 Systems with
June 1 & July 1, under main-
tenance contract. Available
under short term lease at 20%
discount. Contact: Richard
Allen 1562 Lemone Avenue,
Fort Lee, N.J. 07024 (201)
944-5066

WANTED:

(2) IBM 360/40 CPUs
131K or 262K
Immediate Requirement:
Peripherals Optional

Computer Brokers Inc.

810 17th Street N.W.
Washington, D.C. 20006
(202) 669-1344

Wanted

1 2540 Card Read Punch
1 1403 NI Printer
2 2821 Control Unit Model 1
3 2821 Model 2 7 Track Tape
Driver
1 2401 Mod 2 7 Track Tape
Driver
1 2803 Tape Control Unit

For Sale or Lease

1 1403 Model 7 Printer
1 1403 Model 2 Printer
1 1403 Model NI Card Read
Punch
1 2821 Model 2 Control Units

Avaliable 60-90 days. All cur-
rently under IBM maintenance.
We are principals.

Contact: Miss Lark at
(212) 619-2100

FOR SALE
UNIVAC 1004
PANELS AND WIRES
PANEL FULL OF WIRES
\$50.00 each

ARKANSAS VALLEY
INDUSTRIES

300 University Tower Build-
ing
Little Rock, Arkansas
72203

CONTACT: T.W. Walker
(501) 666-0361

COMPUTERWORLD**IBM KEYPUNCHES
IMMEDIATE
DELIVERY**

At our plant we remanufac-
ture all types of unit record
equipment.

Universal Processing Corp.
228 Highland Parkway
Roselle, N.J. 07203
(201) 241-7422

FOR SALE

IBM 1401 Model C5
IBM 1406 Model 3

16K Main Frame
• Advance Programming
• HI-Lo-Equal Compare
• HI-Lo-Subtract
• Tap Intermix
• plus Other Features

Cell or Write:
Mr. Orrin P. Rogen
AFNB
40 N. Euclid Street
Indianapolis, Ind. 46204
(317) 633-1440

**URGENTLY NEEDED
FOR EXPORT****IBM "TAB" EQUIPMENT
AND COMPUTERS**

• BEST PRICES PAID —

Will buy old, only with user
info. Will buy any model, any
number, availability. Will buy ma-
chines on, off, maintenance
agreements, etc. — answer every letter. Com-
puterworld, 60 Austin St., New-
ton, Mass. Box 9070

FOR SALE

All types IBM
Equipment

026, 024, 024, 082, 083
077, 065, 068, 402
047, 064, 105 & 047

TLW Computer Industries
Box 29763, Atlanta, Ga. 30329
(404) 451-1895

IBM MACHINES FOR SALE

024 - 8350; 026 - 82000;
036 - 8400; 077 - 82000;
082 - 8400; 083 - 82000;
084 - 8500; 090 - 82000;

1 1401 Model 2 7 Track Tape
Driver

1 2401 Mod 2 7 Track Tape
Driver

1 2803 Tape Control Unit

ALL DP CO.
Willow Springs, Ill.
312-238-5154

MINIDISK

Are you still running your 1400
"formatted" disks under COMPATI-
BILITY or COS? If so, you
want to break the DISK_Auto-
CODE'r habit and run them under
COBOL?

DO IT WITH MINIDISK!

Our latest compact subroutine
(1500 bytes) written in BASIC into
your COBOL program you can pro-
cess 14000 packs in 3 second mode
presenting results under straight
Compatibility or the COS package.

MINIDISK will process:

1. Continuous Input or Output,
Block or Sequential
2. Random Input or Output,
Blocked/Unblocked.
3. Continuous Sequential Input Un-
blocked only.

Each file (MINIDISK) requires 24
bytes plus 100 bytes for each sector
level. Each file has 200 sectors and 20
sectors for each file. There is no limit
as to the number of files MINIDISK
will handle in a given program.

For more information write:
C.E.S. ASSOCIATES
194 North Stamford Road
Stamford, Conn. 06903
(213) 879-6534

Designed for any System/360
configuration under OS/360.

SOFTWARE**FOR SALE**

7 ext. inch \$82.00
5 ext. inch \$64.00
5 ext. inch \$48.00
4 ext. inch \$42.00
3 ext. inch \$38.00
2 ext. inch \$28.00
1 ext. inch \$14.00

Minimum run at these rates 13
weeks (prepaid).

"CENTAUR"
Automatically converts IBM 360
level E and NCR 316 COBOL to
COBOL for the IBM 4300.

A limited number of licenses are
available. Converter of your
program on a job basis is our
policy.

"ALLIANZE"
A COBOL converter which
converts calendar date to Julian
date.

"ELAPSE"
Calculates actual number of days
between two dates - COBOL.

CUSTOM COBOL Programming
PO Box 1082
Shawnee Mission, Kansas 66222

N/C soft ware**4 to 6
Times the Speed
of AD-APT/
AUTOSPOT**

• IBM 360 - 32K
• 2 to 5 Axis P-to-P & Cont.
• OS or DOS
• Can interface in a multi-
program environment.
• Over 200 companies now
using ACTION.

**numerical control
computer services**

Dr. Eugene Dietzen Co.
25740 Ridge Blvd. • Elkhorn, Wis. 53122
Telephone: 312/681-0868

**IBM 1130 USERS
SAVE MONEY
SAVE COMPUTER TIME
SAVE PROGRAMMER TIME**

Use DNA Utility Program for the 1130. Ext-
ended memory available. NO
MONITOR MODIFICATIONS
needed. For more information
call or write.

"DELETE" Deletes single or
multiple blocks of LET/F7W ar-
ticles without reworking. - 3 seconds

"PACK" - Packs disk at user's con-
venience, not after every delete

"STOREDATA" - Sets up files di-
rectly in UA or FX. Optionally
includes a disk editor to help
with WPS requirements or card reading to
set up large files in FX. - 4 seconds

"STOREMOS" - Loads existing card
files directly to UA or FX. "DUMP-
DATA" - Dumps data to provide back-up for
files larger than WPS.

"STOREDOS" - Option to initialize
existing files to vary no. value. To
write FORTRAN programs to
zero files. "MOVE" - Moves files
between UA and FX.

For more information contact:

DNA Systems, Inc.
2416 W. Stewart Avenue
Milwaukee, Wisconsin 53211
(414) 788-4902

- Specializing in 1130/1100

Your IBM 360 sort time is costing you a bundle. How about cutting it in half? With no conversion

It's PISORT... completely compatible with DSORT... just plug it in and cut your IBM 360 sort time by as much as one-half. If you're operating with 65K or more on DOS, you'll find that PISORT does more than merely cut your sort time. It cuts disk working space in half. It improves turn-around. It eliminates expensive tape merges by handling larger files. **LET PROGRAMMATICS PROVE IT. TRY PISORT FOR 30 DAYS FREE OF CHARGE.**

And that's no real gamble... either for us or for

costs.

you. PISORT is meeting its specs on computers all over the country. We're positive thirty days with PISORT will make you a permanent user. Lease cost, by the way, is only \$200 per month. And we're so confident of the product we've even provided a liberal lease cancellation clause. Now, what's your excuse?



PROGRAMMATICS

a division of Applied Data Research, Inc.
11661 San Vicente Blvd., Los Angeles, Calif. 90048
213 826-6500

for the most rapid service, direct your inquiry to

Applied Data Research, Route 206 Center, Princeton, New Jersey 08540

or call 609 921-8550.

Other Applied Data Research offices and representatives can help you in your own locale...

WASHINGTON, D.C. # 2425 Wilson Blvd.,
Arlington, Va. # 703 533-3141
LOS ANGELES, Calif. # 213 783-4000
18700 Ventura Blvd.,
Encino, Calif. # 213 783-4000
SAN FRANCISCO, Calif. # 415 991-4740
BOSTON, MASSACHUSETTS # 617 484-9212
Post, Woburn, Mass. # 617 944-9212
DENVER, COLORADO # 303 South Logan
St., Suite 1100, Denver, Colorado # 303 777-3794
NEW YORK, N.Y. # 212 544-2000
DATA & INFORMATION PRODUCTS, INC.
(Sales Representatives)
ATLANTA, Ga. # 404 328-3007
CHICAGO, Ill. # 312 692-1158
Park Ridge, Ill. # 312 692-1158

CINCINNATI, OHIO # 4526 Associated Officers,
Inc. 1717 Section Road, Room B-4,
Cincinnati, Ohio # 513 841-8000
SEATTLE, WASH. # 206 467-1000
1000 University, Center Ridge
Road, Cleveland, Ohio # 216 561-1606
DALLAS, TEX. # 400 Town Sq., 2730 Stemmons
Freeway, Dallas, Tex. # 214 888-2000
DETROIT, MICH. # 1100 Grand Blvd.,
Detroit, Mich. # 313 575-5721
KANSAS CITY, MO. # 4648 Wyandotte Ave.,
Kansas City, Mo. # 816 788-0722
MILWAUKEE, WIS. # 414 771-7889
1000 University, Wauwatosa, Wis. # 414 771-7889
MINNEAPOLIS, MINNESOTA # 1115 Plymouth
Road, Minneapolis, Minn. # 612 338-4000
PHILADELPHIA, PA. # 215 585-3000
Bala Cynwyd, Pa. # 215 585-3000
ROCHESTER, N.Y. # 671 Monroe Ave.,
Rochester, New York # 716 442-0420

ST. LOUIS, MO. # 7811 Cimarron Avenue,
St. Louis, Mo. # 314 953-5120

FOREIGN OFFICES

CANADA # (Sales Representative) Dearborn
Computer, 1000 Lakeside, 200 Lakeside Avenue,
Toronto, Ontario, Canada # 416 860-1777
TOKYO, JAPAN # (Sales Representative) Japan
Office Supplies Co. Limited # No. 15-11
2-4-15, Nishi-Shinjuku, Shinjuku-ku, Tokyo, Japan
EUROPEAN # (Product Representative) London,
England and Switzerland # (Sales Representative)
CENTRE D'ANALYSE ET DE PROGRAMMA-
TION # 21 rue de la Paix, 75001 Paris, France
EUROPEAN # (Sweden, Denmark, Norway and
Finland) # (Sales Representative) SYSTEMATIK
AB Banersgatan 37, Stockholm, Sweden